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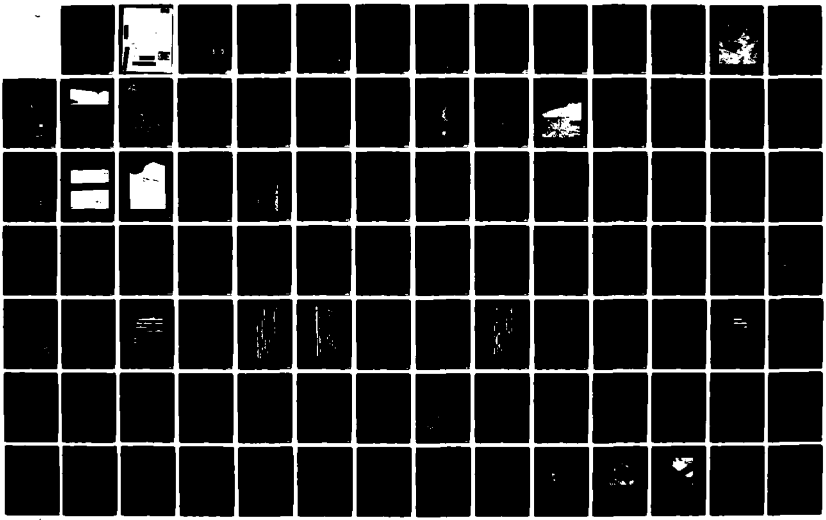

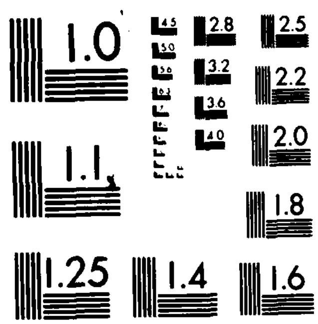

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ARCHEOLOGICAL INVESTIGATIONS IN COCHITI RESERVOIR, NEW MEXICO

Edited by Jan V. Biella and Richard C. Chapman

VOLUME 1: A SURVEY OF REGIONAL VARIABILITY

ARCHEOLOGICAL INVESTIGATIONS IN COCHITI RESERVOIR, NEW MEXICO
VOLUME 1: A SURVEY OF REGIONAL VARIABILITY

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16. Abstract (Limit: 200 words)

A total of 325 archeological sites were documented during surveys of Cochiti Reservoir. Detailed summaries of environmental, architectural, and artifactual variability are presented for each site location. Major occupational periods are Late Archaic, 800 b.c. to A.D. 400, Anasazi, A.D. 600 to 1600, and Historic, ca. A.D. 1540 to present. Most sites are non-structural artifact scatters, frequently associated with hearths, or small one to three room structural sites. One pueblo of 200-400 rooms was recorded. Additional classes of sites include shelters, depressions, terraces, corrals, pens, and petroglyphs. Regional and temporal variabilities can be isolated among the kinds of seasonal, short-term subsistence-related activities represented at sites within a restricted ecological context.

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ARCHEOLOGICAL INVESTIGATIONS IN COCHITI RESERVOIR, NEW MEXICO
VOLUME 1: A SURVEY OF REGIONAL VARIABILITY

Edited by

Jan V. Biella and Richard C. Chapman

Submitted by

Frank J. Broilo
Principal Investigator
and Series Editor

to

National Park Service
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for

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Albuquerque District

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(UNM Proposal No. 101-82)

University of New Mexico
Department of Anthropology
Office of Contract Archeology
Albuquerque

1977

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PREFACE

The Office of Contract Archeology has been intensively involved in cultural resource management studies since its inception in 1973. Responding to the ever-increasing demands of Federal and private energy-related projects and other land modification developments in New Mexico, the Office is developing a viable capability for promoting the preservation and conservation of our fragile and dwindling cultural resource base. As with other institutions performing this service, the evolution of the Office has been conditioned by the necessity to provide research pursuant to the highest expectations of the professional archeological community, the needs of our various clients, and the letter and intent of applicable legislation and procedures.

The requisite and potential resources of a dynamic urban-industrial society require unprecedented exploitation. Discriminating use of our resources, whether they be fossil fuels, space, the atmosphere, or cultural remains, has become imperative. Therefore, the implementation of preservation and conservation strategies presents a formidable challenge to those of us engaged in day-to-day decisions regarding the long-term productivity of our environmental resource base. Difficulties arise from the necessity to efficiently structure research designs, data collection formats, and interpretative results within the time and funding constraints imposed by contract obligations. Despite these constraints, research must directly relate to the overall goals of the archeological community at large, while still satisfying the needs of agencies, the private sector, and the American public.

These considerations, and others, are of particular importance in comprehending the anthropological research conducted by the Office in Cochiti Reservoir. This project was implemented in several investigative phases, each phase involving rigid funding and scheduling conditions. Although by no means exclusive to the Cochiti Reservoir research contracts, a fundamental question affecting all decisions regarding proposal preparation and implementation was, "What can we do in a competent manner with the available funding and time?" The magnitude and successive research stages of the Cochiti Reservoir Project augment the importance of decisions derived from this question. In answer, the Office selected an approach which would maximize what could be accomplished within the time and funding constraints imposed.

Briefly, the operationalized research strategy consisted of delineating specific problem orientations which could productively yield interpretative information from potentially impacted sites within a regional context. Research problems were selected which focused upon explaining observed variation among subsistence activities and settlement patterns of cultural systems in the archeological record of the study area. Fundamentally this task imposed the need to determine two analytical units.

The first determination involved the isolation of relevant regional frames for monitoring much of the entire range of functional settlement loci for a given cultural system, with the recognition that regional boundaries vary from system to system as utilized resources and other environmental variables undergo change through time. The second determination was based upon the selection of sites among the recorded population which could best input data into problems conditioned by the nature of the settlement system and its attendant region of analytical relevance. Inherent in this approach is the consideration that units of measurement for explicating cultural change will vary as a cultural system adapts to variation in environmental parameters. Consequently, changes in technology, demography, and social organization within the adaptive system will be conditioned by the availability of resources in terms of their seasonal productivity, among other factors.

Specifications of this general research direction are developed in Chapter I.2 of this volume. To adequately evaluate the results of the research presented in this and forthcoming volumes, the reader should recognize the imperative need to structure the research program within the limitations of available time and funding.

The present volume will initiate a series of data and interpretative reports reflecting the various research phases. This format is consistent with our goal of segmenting the study into viable units for the purpose of maintaining maximum research productivity, allowing relatively timely dissemination of information, and reducing the rising costs and delays frequently incurred by the preparation and publication of a large final report. This approach will provide the interested reader with incremental amounts of information within shorter time periods, and, at the same time, exhibit reasonable continuity between reports. In addition, the reader has the option of selecting volumes of particular interest.

This and forthcoming reports will be structured to present the research stages of cultural resource assessment, intensive survey of the permanent and flood control pool boundaries, and mitigative studies conducted within these boundaries.

Each phase of the Cochiti Reservoir Project involved the participation of numerous individuals and, in two phases, the Cultural Resource Management Division of the Department of Sociology and Anthropology, New Mexico State University, under subcontractual arrangement with the Office. This institutional cooperation increased the capability of the Office under emergency conditions of immediate adverse impact upon archeological sites. This mutual effort functioned very effectively, considering the urgency of the situation, and indicates the utility of an inter-institutional effort when dictated by circumstances such as those encountered during the course of this project. This and continuing research in the Reservoir has been enhanced by the helpful assistance of the United States Army Corps of Engineers, Albuquerque District, and the National Park Service, Southwest Region, Santa Fe.

The information provided by this research program will contribute substantially to our understanding of prehistoric and historic human cultural adaptations in the Rio Grande Basin. Concomitantly, the interpretative results of this study will enable more elaborate evaluations of the scientific significance of archeological sites encountered in subsequent cultural resource management projects undertaken in the region.

Frank J. Broilo, Principal Investigator
Director
Office of Contract Archeology

June, 1977

ACKNOWLEDGMENTS

The information presented in this volume represents the contributions of many individuals over a long, two year period. In many cases those individuals and others worked in different capacities on various aspects of the project, all of which were critical to the completion of the present volume. We wish to express our thanks to these individuals at this time.

Principal investigator throughout the project was Frank J. Broilo, and project director was Jan V. Biella.

Survey of the permanent pool was conducted by Richard C.. Chapman, supervisory archeologist James G. Enloe, Karl W. Laumbach and John R. Stein, assistant Archeologists. Enloe acted as supervisory archeologist during survey of the flood control pool, with assistant archeologists Paul S. Grigg, Michael P. Marshall and John R. Stein. E. Ann Ramage and Allen Rorex were assistant archeologists for a portion of the flood control pool survey as well.

Both surveys were conducted under extremely rigid time constraints imposed by proposed impoundment schedules. The White Rock Canyon terrain posed considerable problems in survey logistics, especially in the upper portions of the canyon, which were totally inaccessible by vehicle, and weather conditions in the survey area were extreme. White Rock Canyon, as perceived at least from a surveyor's viewpoint, has never felt the gentle breath of spring or the crisp clear days of fall. Its climate is rather two-fold in nature, winter and summer. Survey of the permanent pool was conducted during winter (February) and survey of the flood control pool was conducted during summer (May, June and July); and both were miserable. We appreciate the spirit of dedication with which both surveys were conducted.

The overall design and continuing evolution of survey methodology was a joint effort on the part of all individuals who constituted the survey crew. Others who contributed to the survey design included Emily Abbink (historic artifact documentation) and A.H. Warren (ceramic artifact documentation).

Also to be thanked are Mr. and Mrs. Fred Dixon, caretakers of the Canada de Cochiti Grant, for their concern and graciousness in permitting field crews to camp within the grant, and in providing access through the grant for survey purposes. The Dixons' active cooperation throughout all phases of field work rendered many of the logistical circumstances encountered by field crews much less difficult than they might have been, and their help is greatly appreciated.

Especial thanks to Anita Klaenhammer for housing part of the flood control pool survey crew when their boat sank, separating them from their camp.

Cordelia Snow, Laboratory of Anthropology, Museum of New Mexico was especially helpful through providing fast turnaround in granting permanent Laboratory of Anthropology (LA) numbers for sites newly documented during survey.

Independent research resulting in papers comprising portions of the volume was conducted by Emily K. Abbink and John R. Stein (historic research), G. Robert Brackenridge (hydrology), Ann C. Cully (paleoclimate), Dwight L. Drager and Richard W. Loose (vegetative stratification), Patricia J. Marchiando (fauna), E. Ann Ramage (agricultural stratification), Gail D. Tierney (vegetative studies) and A.H. Warren (geology). Lisa Jones assisted Tierney during the field phase of the vegetative study.

John M. Campbell (Department of Anthropology, UNM) was a very helpful consultant with respect to documentation of faunal species within the study area. In similar fashion, Linda S. Cordell (Department of Anthropology, UNM) suggested possible techniques for stratifying landforms with respect to arable potential; and W. James Judge (Chaco Research Center, National Park Service) was of great help as a general consultant for a variety of research problems.

Laboratory work, which involved considerable time investment into processing and computerization of survey data, was conducted by several individuals under the general direction of Jan Biella and Richard Chapman. Pat Marchiando, Joan Mathien, Jeanne Schutt and Sara Stech spent many exhausting hours coding, punching and proofing survey data. Lynn Jorde served as programmer, and we are indebted for his expertise and efficiency in that regard.

Preparation of initial manuscript drafts, preliminary reports and the final volume itself necessitated considerable, often quite tedious, work on the part of many. Typists, who generally played dual roles of typing and editing, included Mary Abernathy, Margaret Brooks and Catherine Lopez.

Illustrations were drawn by Susan McLean and Emily Abbink. Layout was developed by Susan McLean.

Jan V. Biella
Richard C. Chapman

June, 1977

ARCHEOLOGICAL INVESTIGATIONS IN COCHITI RESERVOIR, NEW MEXICO
VOLUME 1. A SURVEY OF REGIONAL VARIABILITY

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(Courtesy of the U.S. Army Corps of Engineers)

I.1
The Cochiti Reservoir Archeological Project

FRANK J. BROILO and JAN V. BIELLA

INTRODUCTION

The anthropological research reported in this and forthcoming volumes will present results of a multiphase cultural resource management program in Cochiti Reservoir, New Mexico. This research has involved stages of assessment, intensive survey and mitigation and is pursuant to the following statutes and executive order: the National Historic Preservation Act of 1966 (80 Stat. 915); the National Environmental Policy Act of 1969 (91 Stat. 852), and Executive Order 11593 (36 F. R. 8921). Both the National Park Service, Southwest Region in Santa Fe, and the U. S. Army Corps of Engineers, Albuquerque District, have sponsored different phases of this research with the National Park Service administrating all phases of the research.

SALVAGE AND CULTURAL RESOURCE MANAGEMENT FRAMEWORKS

To comprehend the context and scope of this multiphase research program for the Cochiti Reservoir, the basic distinction between research conducted under salvage laws as opposed to cultural resource management laws must be understood. King (1975:2) has pointed out a basic difference between the two sets of authorities. Within the scope of salvage laws, land-modification projects received priority. Financially limited archaeological investigations were considered after projects began and were restricted to those measures which could be conducted prior to project execution. Cultural resource laws, however, require that formal consideration of archeological resources take place during project planning phases. Thus preservation and conservation of cultural resources are integral to the design plan of the project.

Previous and current contract research in Cochiti Reservoir has been implemented with strategies conditioned by salvage law. In this context, the amount of available funding, time frames, research design and problem orientations comprise critical parameters of the current archeological program. These have been the subject of intensive evaluation and adjustment in order to maximize the preservation and conservation of cultural resources under conditions other than those encountered in cultural resource management law. It should be emphasized, however, that the research potential of the investigation has been enhanced by the multiphase nature of the contracts which have provided a means of continued research involvement. In this regard, the multiphase contracts and feedback provided by previous research conducted by the same institution have enabled a continuity of professional staff, problem orientations and refinement of research objectives.

In light of the exigencies and goals stated above, the present research structure reflects the concern expressed by Lipe (1974:214) that archeological resources are limited and nonrenewable. Further attrition of resources by means of salvage methods should be considered only as a last alternative when other measures for protecting the resources are not possible.

This professional stance has received due consideration in formulating scientific significance of the resources as obtained from intensive survey within the boundaries of the project and has been evaluated in terms of extant and probable impacts of the reservoir and its facilities. In conjunction with an assessment of funding and time constraints, a sampling strategy has been evolved for mitigation pursuant to the informational requesites of the research design which focuses upon sites exhibiting various degrees of direct and indirect impact. In this approach sites having nonimpact status are amenable to tacit and active preservation alternatives which contribute to the long-term productivity of the resources in the region.

LOCATION AND EXTENT OF PROJECT AREA

Cochiti Dam and Reservoir and attendant facilities are located in the northcentral New Mexico in parts of Sandoval, Santa Fe and Los Alamos Counties. Easements for the project were obtained by the U.S. Army Corps of Engineers from Pueblo de Cochiti (4069 acres), U. S. Forest Service (8236 acres), Atomic Energy Commission (345 acres), National Park Service (361 acres), University of New Mexico (540 acres), and private individuals (139 acres) (U.S. Army Engineers 1974:I-4). The project area for this study, however, will only concern the 9060 acres which will be directly impacted by Cochiti Reservoir.

Cochiti Reservoir follows the Rio Grande and lies largely in White Rock Canyon although it extends southward across the Santa Fe River (see Fig. I.1). Within Cochiti Reservoir two distinct project areas may be defined: the permanent pool or reservoir itself and the maximum flood pool or projected flood control area.

1. Permanent Pool

The permanent pool lies almost completely in White Rock Canyon and follows the 5322 ft contour upstream from Cochiti Dam. The main portion of the permanent pool is approximately 2.4 km long and 0.8 km wide. The pool extends to the mouth of Alamo Canyon nearly 12.9 km above the dam. The permanent pool will encompass approximately 1240 surface acres with a shoreline of 33.9 km. Cultural resources directly impacted by the permanent pool are estimated to be flooded with silt deposited for the duration of the dam and project, in excess of 100 years (U.S. Army Engineers 1974: VI-1).

2. *Flood Control Pool*

One of the major intents of Cochiti Dam is to arrest the damaging flood flows downstream in the Middle Rio

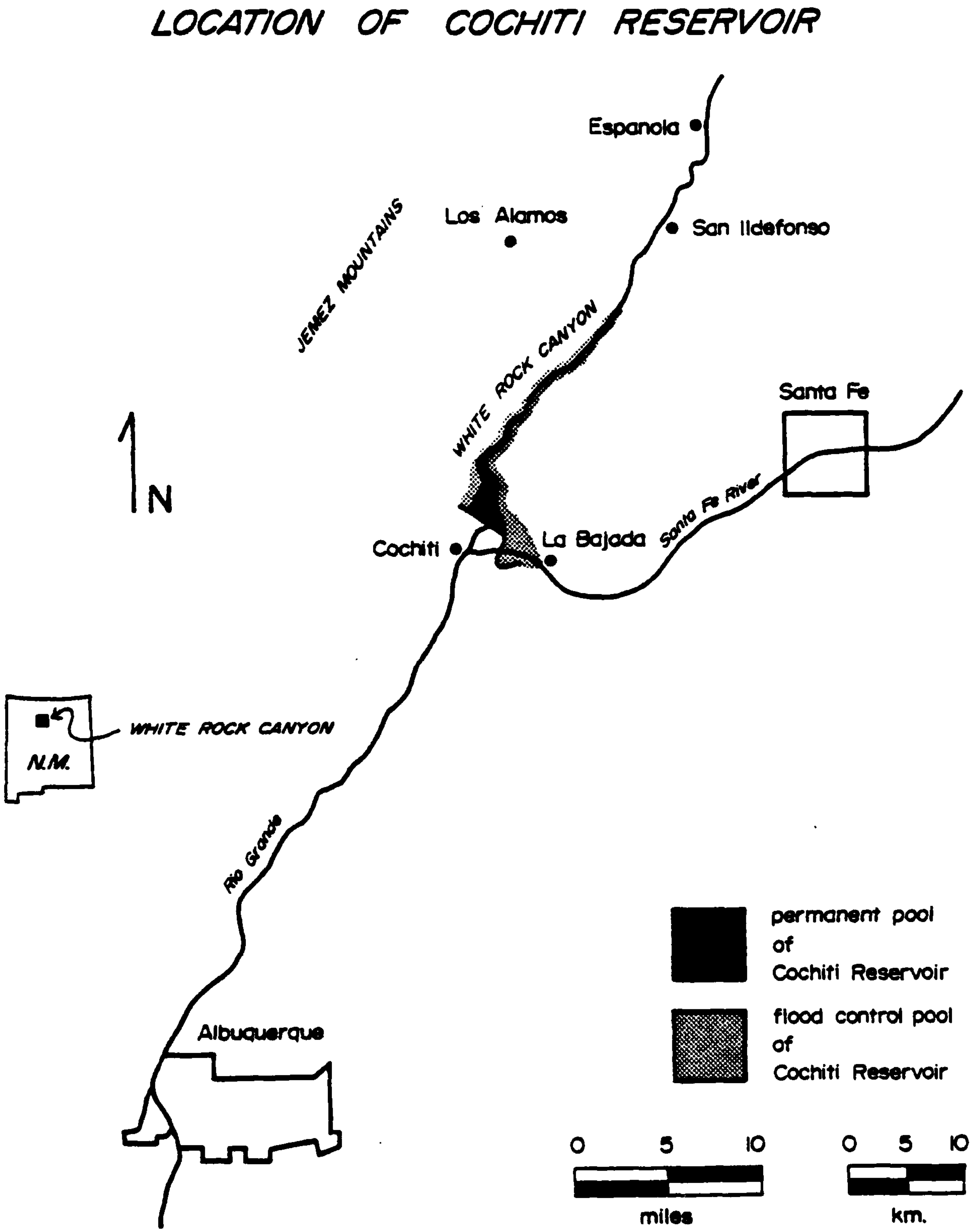


FIG. I.1.1 Location of the Permanent and Flood Control Pools of Cochiti Reservoir

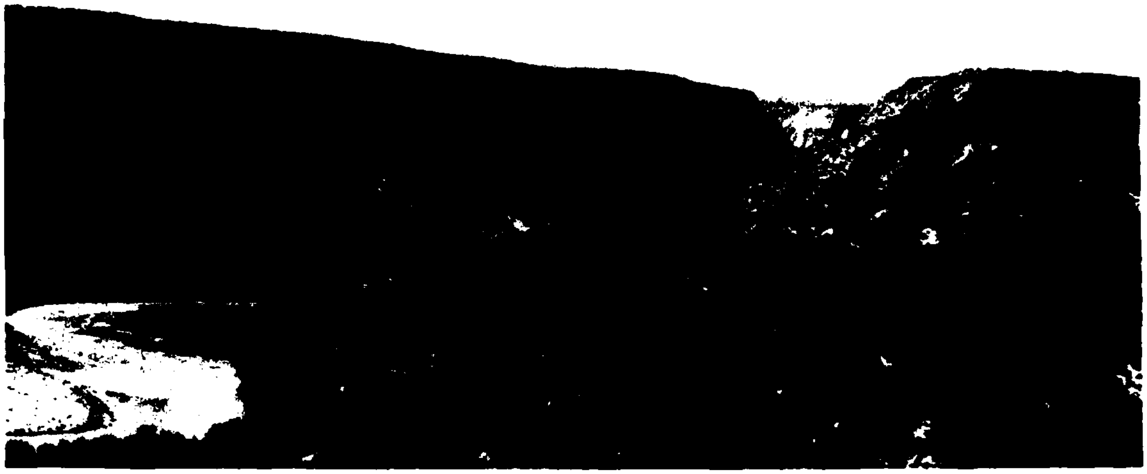


FIG. 1.1.2 White Rock Canyon, looking north, at a point approximately 13 kilometers above Cochiti Dam

Grande Valley and thus the largest number of cultural resources endangered by the reservoir are those located within the flood limits. At a projected maximum extent, the flood control pool would have a surface area of 9060 acres and would follow the 5460.5 ft contour. This pool would extend from the Santa Fe River north into White Rock Canyon approximately 32.3 km.

CONTRACT RESEARCH IN COCHITI RESERVOIR

Archeological investigations in conjunction with the construction of Cochiti Dam and attendant facilities resulted in the partial survey and excavation of cultural resources within the boundaries of Cochiti Reservoir (Lange 1968; Snow 1971, 1973b, 1973c, 1973d). In order to ascertain the nature and extent of these studies in the reservoir and to provide a complete inventory of cultural resources to be adversely impacted by the filling of the permanent pool of the reservoir, a continuation of archeological research was warranted (U.S. Army Engineers, 1974). In December 1974, the National Park Service, Southwest region, granted United States Department of Interior Contract No. CX700050323 to the Office of Contract Archeology, University of New Mexico (UNM Proposal No. 101-82) to obtain this information in the form of an *archeological assessment* (Biella and Chapman 1975). Pertinent elements of this assessment are provided in this volume.

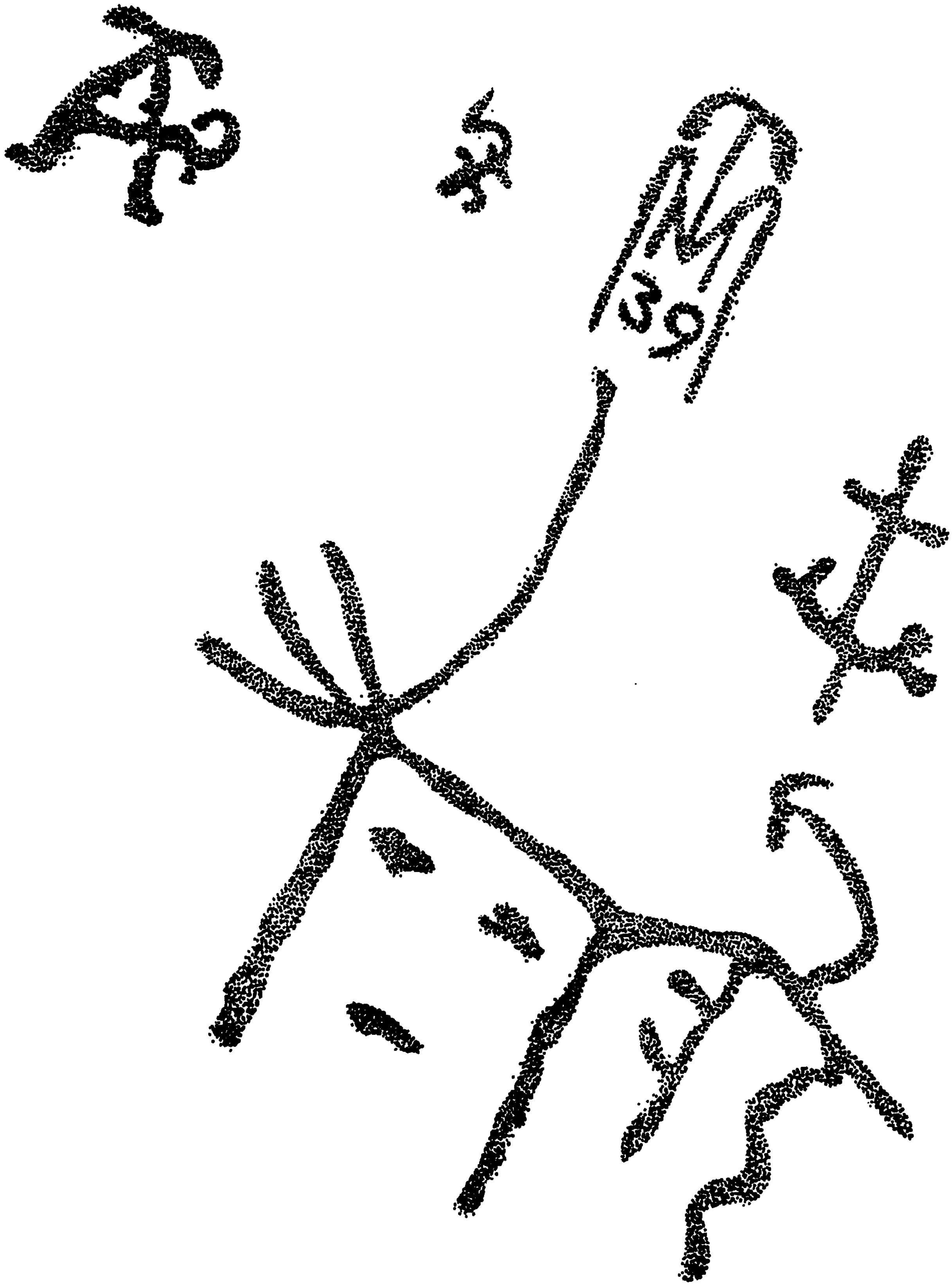
Due to the projected magnitude of research required to evaluate and mitigate the adverse impacts of Cochiti Reservoir upon cultural resources, in conjunction with the desirability of sustaining a high level of professional research capability, personnel from the Cultural Resources Management Division of New Mexico State University (Stanley D. Bussey, Principal Investigator) were requested by the Office of Contract Archeology to participate in this and subsequent phases of the research program.

In February 1975, a second phase of the Cochiti Reservoir research program was initiated under United States Department of Interior Contract No. CX700050431 (UNM Proposal No. 101-108A and B). This phase of research focused upon 1) developing and completing a program of mitigation of the adversely impacted resources in the permanent pool of Cochiti Reservoir, and 2) conducting an intensive survey of the flood control pool of the reservoir. An inventory of the cultural resources recorded in the flood control pool and an evaluation of their significance are presented in this volume. Results from the program for mitigation are presented in the second volume of this series.

In June 1976, a third phase of research which is currently being implemented to provide mitigation studies for adversely impacted resources in the flood control pool of Cochiti Reservoir was let under United States Department of Interior Contract No. CX7029-60151 (UNM Proposal No. 101-127B). The results of this work will be presented in the third and fourth volumes of this series.

OUTLINE OF PUBLICATION VOLUMES

In view of the magnitude of the project and the continuity of research between different contracts, spanning a continuous period in excess of three years, reports which summarize different phases of the archeological investigations in Cochiti Reservoir have been organized into several volumes. Each volume has been designed to be read as both an individual entity and part of a continuing research series. This first volume presents the results of the assessment and intensive survey phases of the first two contracts. The second and third volumes will present information derived from the programs for mitigation for the permanent and flood control pools, respectively. The subsequent volume will address a series of specific research problems for which the data collected during the assessment, intensive surveys and mitigation programs are applicable.



I.2
Research Perspective

RICHARD C. CHAPMAN and JAN V. BIELLA

INTRODUCTION

Throughout the last decade, anthropological research has been directed increasingly toward explanation of variability in human behavior from an ecological and energetic perspective. This explanatory concern essentially assumes that human cultural behavior is adaptive in nature, and that apparent differences among cultural systems can be understood as the result of interaction between human populations and the environment in which they exist.

Although a variety of conceptual approaches have been offered to account for such cultural and ecological relationships (Steward 1938, 1955; White 1959; Binford 1968), there exists at present no true agreement among anthropologists as to a single body of concepts or analytical procedures through which those relationships can be isolated or explained in a theoretical sense. This research has, however, resulted in the definition of potentially productive realms of inquiry which might be employed to pursue the general problem of cultural-ecological process for purposes of explanation. These will be examined for their relevance in assessing the significance of cultural resources within the Cochiti Reservoir Project area.

CULTURAL BEHAVIOR AND ADAPTATION

Review of Previous Models

One major result of previous anthropological inquiry into the relationship of culture and environment has been a qualified consensus that human cultural behavior can be viewed either wholly or in part as an extrasomatic means of adaptation to the environment (White 1959), and that the organization of cultural behavior can be viewed as systemic in nature (Vayda *et al.* 1961; Binford 1964; Clarke 1968; Rappaport 1969). In this sense, human cultural behavior has been viewed as a self-organizing system of behavioral components through which a human population extracts energy from the environment and circulates energy through individual members of the population.

Although the general tenets that cultural behavior can be viewed as a system and functions as an adaptive mechanism are generally agreed upon, discussion concerning how those concepts can be used to account for variability in cultural behavior has not yet resulted in a clearly defined set of explanatory principles. Major conceptual problems in this regard include the way in which both cultural behavior and environmental variability should be stratified into components of a system, the manner in which those components interact in systemic fashion, and definition of processes underlying evolutionary change in the structure and organization of those components.

One of the first attempts to apply the principles of general systems theory to explanation of human behavior was undertaken by White (1949; 1959). White essentially posited that the structure of cultural systems could be analytically stratified into three behavioral components: technological, social and ideational. He further suggested that organizational relationships among these components were largely conditioned by variability in technological behavior, in that technology serves as the means through which a human population extracts energy from the environment. White thus viewed technolgical behavior as an "independent" variable in the sense that evolutionary change from simple to more complex forms of social or ideational behavior could be understood in large part as "dependent" responses to the degree of task specialization, labor organization or other administrative concerns necessitated by different technologies of energy extraction.

White thus addressed problems of stratifying cultural systems into components of behavior and defining how those components interacted as parts of a system, and attempted a rudimentary postulation of processes underlying evolutionary change among cultural systems. His conceptual approach, while stated in highly qualified terms and subject to much particular criticism by others, is especially provocative for the study of prehistory because the archeological record of past cultural systems is most highly visible as material remnants of technological behavior. The conceptual utility of White's approach for the study of archeological data has been explicitly formalized by Binford (1962, 1964).

Considerable previous research has been directed as well toward problems of stratifying environmental variability into units of observation relevant for explanation of specific relationships between the environment and components of human cultural behavior. Steward (1938) examined variability in forms of social organization among the Great Basin Shoshone and suggested that the kind, spatial distribution and seasonality of food resource species comprising the subsistence of that population might well play a significant role in the size and social composition of local populations throughout different seasons of a given year. Although Steward was reluctant to posit a deterministic relationship between environmental variability, social organization and processes of cultural evolution (Steward 1955), his concept of environmental stratification relevant for examination of those relationships has served as the foundation for nearly all subsequent cultural-ecological research.

The impact of Steward's conceptual approach is exemplified in the studies of Vayda *et al.* (1961), Rappaport (1969) and Lee (1968) among others, each of which has explored the degree to which variability in structure and organization of both subsistence and social behavior of particular human populations can be explained as systemic responses to an environment conceived as a set of food resource species.

Flannery (1968) has proposed an essentially similar environmental stratification as part of a general model posited to delineate processes underlying systemic change in subsistence behavior from the standpoint of archeological data. Flannery suggests that environmental variability relevant for understanding cultural change in economic or subsistence behavior can be defined as spatially distributed sets of vegetative and faunal food resource species.

His model suggests that human subsistence behavior can be analytically stratified into a set of "procurement systems," each of which is defined as a set of activities necessary to procure and process particular vegetative or faunal food resource species or genera. These resource specific procurement systems are integrated into an overall subsistence system through two regulatory mechanisms, "seasonality" and "scheduling."

Seasonality refers to the different yearly and multiyear cycles of productivity exhibited by food resource species. In this sense a particular genera or species of cactus might produce fruit suitable for procurement and consumption during only one period of each year, whereas a particular species of grass might produce harvestable seeds during a different period of that year. The spatial distribution of food resource species within a given region is not uniform, and when taken in its entirety, the effective environment can be viewed as a continually fluctuating landscape of food resources.

Flannery suggests that human subsistence behavior must essentially cope with the spatial distribution and seasonally regulated structure of resource availability within a region through scheduling the performance of procurement activities. Scheduling can thus be viewed as a logistical mechanism which "places people where the foods are" to coincide with productivity cycles exhibited by different food resource species.

It is felt that the basic tenets of Flannery's conceptual approach offer considerable potential as a set of concepts through which archeological data might be gathered and organized for purposes of cultural-ecological analysis. This concept suggests a means through which material by-products of technological behavior can be employed as information concerning the operation of subsistence systems in the past. The conceptual approach further suggests a means through which the spatial distribution of site locations exhibiting evidence of technological behavior can be employed as information concerning the overall articulation of subsistence behavior with the seasonal structure of food resource availability within a region.

It is clearly beyond the scope of this brief review to undertake a lengthy and detailed discussion of all published research concerning the general conceptual problems of definition and explanation of human cultural behavior from an adaptive, systemic perspecitve. The research of White and Steward served to stimulate considerable theoretical debate focusing upon most basic tenets underlying those issues, and it is felt that the directions taken by much anthropological research within the last decade have reflected those general concerns through a variety of particular studies.

For these reasons, the following discussion will draw upon that research to refine a set of concepts concerning the relationship of cultural behavior and environmental variability which can be used both to assess the significance of cultural resources within the Cochiti Reservoir project area, and to guide the nature of future archeological research within the project area and the Middle Rio Grande region in general.

Archeological Application for Modeling Cultural Behavior and Adaptation

The outline discussed below is intended to serve in part as a definition of cultural and environmental variables which can be monitored through archeological research, and in part as an approximateion of systemic relationships pertaining among those variables. An attempt has been made to delineate both the variables and their interrelationships such that differences or similarities in the archeological record of human cultural behavior might be explained through reference to principles of general systems theory. The concepts are thus intended to serve in part as a set of working hypotheses, the general explanatory utility of which is subject to empirical testing.

Human cultural behavior will be defined provisionally as a set of systemically organized behavioral components through which a human population extracts energy from the environment and distributes that energy throughout all members of the population. This definition involves several terms, each of which will be treated in the following discussion.

1. Energy

The term "energy" refers to an abstract concept generally understood as the capacity to do work. Without going into various mathematical formulations posited from the physical or informational sciences to account for the term, energy can be defined in this disucssion as some measurable quantity of ingestible food. Both weight and caloric value of foodstuffs have been generally employed by anthropologists as monitors of energy.

2. Definition of Components

No such general anthropological agreement as to definition of behavioral components of a cultural system exists at present. As discussed previously, White (1959) suggested that cultural behavior might be stratified into technological, social and ideational components; and Binford (1962, 1964) has pursued the analytical potential of that stratification for purposes of archeological analysis. Although the general energetic considerations espoused by both White and Binford have resulted in a demonstrable shift of explanatory emphasis in subsequent ethnological and archeological research, their proposed stratification of cultural behavior into components is very general in nature.

It is felt that Flannery's (1968) discussion of procurement systems offers considerable potential for defining behavioral components amenable to more explicit archeological observation. Flannery has suggested that subsistence behavior might be analytically stratified into sets of activities necessary to procure particular food resource species or genera. Although his discussion treats these different sets of activities as "procurement systems," the activities themselves might be profitably viewed as behavioral *components* an adaptive system.

It can be suggested that food resource procurement

activities, if narrowly defined as those related solely to usage of tools and facilities for purposes of food resource acquisition, constitute only one set of activities necessary to extract and distribute energy throughout all members of culturally organized human population. Other activities necessary in this regard include processing, transportation, storage and consumption of food resources; and each of these activity realms may necessitate additional sets of activities for implement and facility construction.

It is thus posited that behavioral components of an adaptive system of cultural behavior can be defined as a set of *subsistence related* activities through which a human population extracts energy from a variety of food resource species. These activities include the general realms of food resource procurement, processing, and consumption; and related sets of activities involving the manufacture and maintenance of both implements and facilities necessitated by those general realms. For purposes of the model, food resource production such as animal husbandry or agriculture can be conceived as an aspect of procurement.

This kind of stratification is especially amenable for descriptive treatment of archeological data, because the archeological record of a cultural system is in great part comprised of material by-products of subsistence related behavior undertaken at different spatial loci across the landscape. It is also suitable for comparative quantitative analysis of complexity in both formal and thermodynamic structures of cultural adaptive systems.

In this sense, a system exhibiting a very simple structure and high thermodynamic efficiency would be characterized by nonagricultural food resource procurement activities involving utilization of a few number of generalized multi-functional implements, processing activities utilizing those same implements, and essentially "immediate" consumption of procured and processed foodstuffs which involved little more than construction and use of a hearth facility.

A primitive agriculturally based system, however, would exhibit a much greater degree of structural complexity and considerably lower thermodynamic efficiency. Employing a simplified example of maize production within an arid environment, procurement activities would involve an initial set of activities to prepare agricultural plots, which might involve utilization of specialized implements such as hoes. A secondary set of maintenance activities including weeding, replanting, pest control and perhaps irrigation would then be necessary to bring the crop to fruition. Part of the crop might then be consumed and the remainder subjected to processing (such as drying, or roasting and drying) for storage. Effective storage would necessitate yet another set of activities for construction of storage facilities. Post-storage processing of the resource for consumption would require the manufacture and utilization of specialized milling implements to reduce the resource into a form suitable for reconstitution, and dependent upon the mode of reconstitution, consumption itself would require manufacture and utilization of a set of specialized containers such as ceramic vessels, or specialized cooking implements such as comales or piki stones. Manufacture of these latter items might well necessitate ancillary sets of activities "to make the tools to make the tools."

It can be suggested, then, that a conceptual stratification of cultural behavior into components defined as sets of subsistence related activities is not only highly amenable for purposes of archeological description, but is as well of potentially great productivitiy for purposes of comparative analysis of both structural complexity exhibited among different systems, and energy exchange relationships characterizing the operation of different cultural systems.

3. Systemic Articulation of Behavioral Components

A third concern which must be addressed is that of how these behavioral components are interrelated in systemic fashion. Again, it is felt that Flannery (1968) has offered a highly productive approach to the problem. His concept of scheduling embraces two related aspects of subsistence behavior: first, that of coordinating the performance of procurement activities through time to coincide with the temporal distribution of food resource species; and second, that of coordinating the performance of those activities across space to coincide with the spatial distribution of food resource species.

It can be suggested that Flannery's general concept of scheduling might be more finitely defined for descriptive and analytical purposes as a set of logistical strategies through which procurement, processing and consumption activities are integrated into a system of behavior to fulfill the energetic needs of a human population.

In this sense the spatial distribution of water, food resources and technological raw materials comprises one aspect of environmental variability which must be "solved" with respect to a spatial referent through logistical strategies involving transportation of personnel and/or resources. The periodicity in productivity exhibited among different food resource species (and water supply) comprises another aspect of environmental variability which must be logistically "solved" with respect to a temporal referent through scheduling the time or performance of subsistence related activities.

Just as transportation can be viewed as a logistical strategy which copes with spatial distribution of resources, storage can be viewed as a logistical strategy which copes with temporal periodicity in the productivity of resources.

The degree to which either of these strategies necessitates ancillary energy investment in the form of specific activities for construction and maintenance of facilities (such as roads or storage structures), will have a substantial effect upon the overall structural complexity of an adaptive system as monitored by the number and kind of behavioral components required. Particular forms of human social organization might be profitably examined as logistical strategies in this regard, which function largely to articulate the activities of individuals for purposes of food procurement and for purposes of allocating those food resources among individuals comprising the effective population.

The concept of spatial and temporal scheduling thus permits analysis of cultural behavior as a system, in that change in the logistical scheduling of one activity component will have a deviation amplifying or retarding effect upon the performance of other activity components.

In this sense, the decision to expend time in procurement of a single food resource during a particular season

of the year can be systemically viewed as necessarily limiting the amount of time which might have been available for procurement of a different food resource during that season. In a similar sense the decision to procure food resources at one spatial location during a season can be viewed as necessarily limiting options to procure food resources at other spatial locations during that same period of time.

Dependent upon the ratio of time invested to volume of foodstuffs procured at different locations, a substantial increase in time investment for procurement of particular food resources would necessitate varying degrees of both spatial and temporal adjustment throughout the entire logistical strategy articulating subsistence related behavior. Such logistical changes, if necessitated through a period of years, could be expected to result in a substantially different structure and articulation of activities before the system again stabilized, which would be archeologically observable as the development of "new" technologies of food procurement, processing or consumption; redefinition of local food resource species, and dramatically different strategies of settlement within a given region.

REGIONAL FRAMES OF ADAPTIVE BEHAVIOR

In order to delineate the structure and organization of a particular adaptive system or to isolate processes of change from one system state to another through time, the operation of adaptive systems must be observed across broad portions of the landscape (Binford 1964; Flannery 1968; Clark 1968; Rappaport 1969).

This previous research suggests that two methodological considerations are necessary in operationalizing a regional approach to the study of adaptive behavior. The first of these resides in defining categories of environmental variability relevant to explanation of adaptive behavior. The second of these resides in delineating relevant "on the ground" spatial boundaries which delimit that variability. The methodological approach taken in the Cochiti Reservoir Project incorporates these considerations and is outlined below.

Definition of Regional Environmental Content

When the components of an adaptive system are viewed as a set of subsistence related activities, the relevant environmental content of a region can be defined as two general realms of variability. These are *technological resources* which include all materials from which tools and facilities are manufactured by a human population; and *food resources*, including all species which constitute sources of ingested energy to maintain the physical viability of the human population. These two resource categories are not mutually exclusive in that some food resource species may also provide technological resources in the form of bone, antler, hide, etc., for tool and facility manufacture.

The distribution of different food resource species within a region cannot be treated as static or finite either spatially or temporally. Spatial distribution of floral food resource species is largely determined by soil types, landforms, elevational gradients and climatological cycles. Their productivity varies considerably through seasonal, yearly, and multi-year cycles. Spatial distributions and productivity of more mobile faunal food resource species exhibits similar periodicity through seasonal and yearly cycles.

This kind of temporal periodicity in productivity and spatial distribution of food resource species within a region must essentially be coped with by a human population through the operation of logistical strategies concerning human population movement, food resource transportation, food resource storage, and social relations governing labor organization and redistribution of food resources among members of the population. The finite distribution of nonliving technological resources, including materials suitable for manufacture of tools and facilities essential to the pursuit of subsistence related activities, constitutes another set of parameters which must be dealt with logistically.

It is thus clear that the articulation of a human population with an environment can be specified at two levels of adaptive behavior. The first of these is at the level of subsistence related activities resulting directly in energy extraction and ingestion through procurement, processing and consumption of food resources. Such behavior necessitates employment of an ancillary set of activities for manufacture of tools and facilities required in these subsistence related pursuits.

The second level of articulation is found in the logistical strategies through which subsistence related activities are scheduled temporally and spatially within the environment so as to cope with variability in distribution, periodicity and productivity of food resource species, and distribution of technological resources. Included in this logistical organization are social mechanisms governing the redistribution of food resources throughout individual members of the human population.

A critical methodological concern in evaluating these two levels of articulation of an adaptive system with the environment resides in the "effective" nature of environmental content dictated by the specific structure and organization of particular adaptive systems being examined. The effective food and technological resource content of a region is observably different for a foraging, nonagricultural adaptive system than it is for a sedentary agricultural or industrial nation-state adaptive system. For this reason, regions selected as units of observation for archeological analysis must be stratified into categories of food and technological resource variability appropriate to the range of adaptive systems known or expected to have operated within the boundaries defined. A similar methodological concern must be resolved in specifying spatial boundaries of a region.

Definition of Regional Boundaries and the Study Area

Previous studies which have employed the regional concept as a frame of reference for understanding adaptive behavior have either explicitly or implicitly attempted to define spatial boundaries of an area of study which approximate the regional boundaries of the adaptive system or set of adaptive systems being examined. Boundaries of such study areas have usually been defined operationally through delimiting the territorial extent of culturally organized human populations based upon ethnographic or historical data (Steward 1938; Damas 1969; Stuart 1972, among others). Definition of regional boundaries for purposes of archeological research have generally been *a priori* attempts to replicate such territorial boundaries for past adaptive systems through use of "natural" physiographic features such as drainage sys-

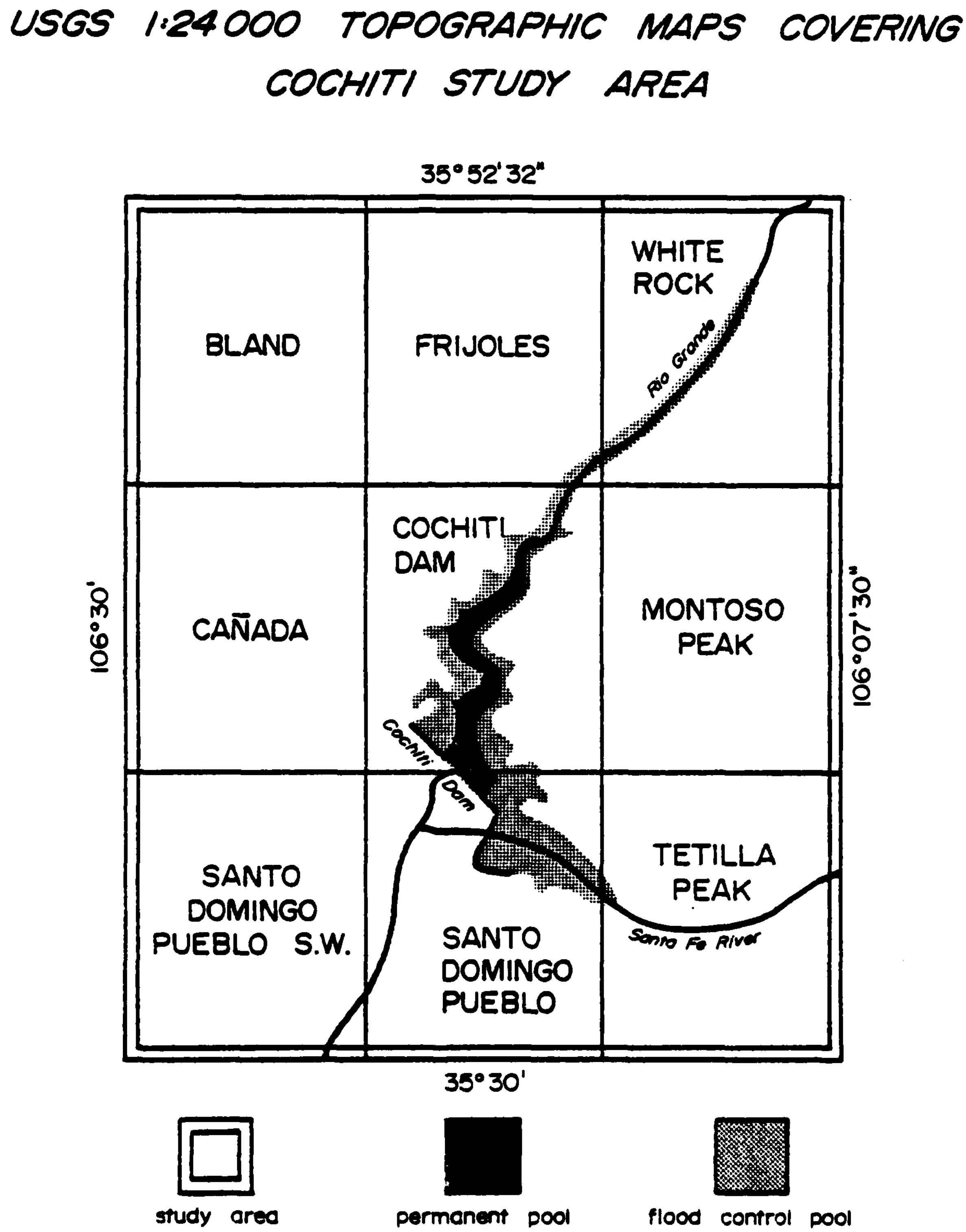


FIG. 1.2.1 USGS Topographic Maps Covering Cochiti Study Area

tems or basin and range structures (Willey 1953; MacNeish 1964; H.S.R. 1973).

Definition of regions for archeological study in this fashion, however, does not take into account the expectation that *different systems of adaptive behavior* require different territorial or regional boundaries dependent upon population size, subsistence strategy or degree of technological sophistication, among other considerations. A mountain range might thus be expected to serve as a regional boundary for a band-organized foraging adaptive system in the past but cannot necessarily be expected to serve as a regional boundary for the operation of an industrial state.

From an archeological perspective, then, a specific portion of the landscape can be expected to exhibit material evidence of the operation of several adaptive systems of human behavior, each of which was characterized by different strategies of resource utilization and territorial size. Because of this, definition of spatially delimited *study areas* for purposes of archeological research should not be undertaken to replicate the presumed effective territorial or regional boundaries of any single system in the past. Study areas must rather be delineated which encompass sufficient environmental variability, and as such, are large enough in spatial extent, potentially to exhibit patterning in the structure and organization of several previous adaptive systems.

Several factors were critical in selecting boundaries for such a study area which could be employed as a unit of observation to assess the significance of archeological resources within the project area. After a review of previous literature concerning cultural resources within White Rock Canyon and its environs, it became apparent that the boundaries of the project area itself were too restricted to serve as a study area. The project area did not encompass much environmental variability characteristic of the immediate vicinity which would be expected to condition the range of subsistence related activities undertaken at different site locations within the canyon itself. Further, the boundaries of the project area were not large enough to encompass patterning in settlement necessary to understand the operation of logistical strategies through which those subsistence related activities were organized into different systems of adaptive behavior.

For these reasons a study area was defined which encompassed the range of environmental variability in the vegetative communities and landforms exhibited throughout most of the Pajarito Plateau and Cerros del Rio formations which flanked the project area on the west and east. Through this procedure, it was considered that enough redundancy in environmental variability had been delimited to permit isolation of patterns in the adaptive systems of past human populations inhabiting the general region.

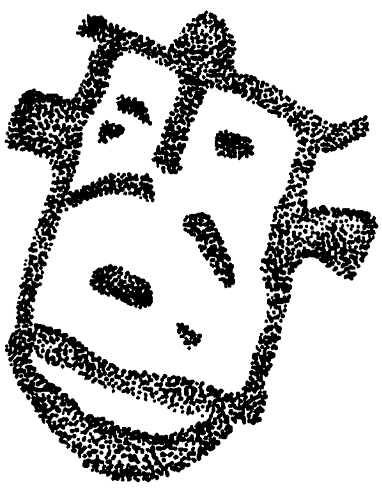
The boundaries for this study area thus selected lie between 106°30' and 107°7'15" north latitude, and 35°37'30" and 35°52'30" east longitude, and include the following 7.5 minute U.S.G.S. New Mexico quadrangles: Bland, N.M.; Canada, N.M.; Cochiti Dam, N.M.; Frijoles, N.M.; Montoso Peak, N.M.; Santo Domingo Pueblo, N.M.; Santo Domingo Pueblo SW, N.M.; Tetilla Peak, N.M., and White Rock, N.M. (see Fig. I.2.1).

The study area, as defined by these quad sheets, will serve to define a regional unit of observation for environmental and archeological research presented in this and subsequent volumes. The following section will document several realms of environmental variability appropriate for examination of adaptive behavior within that study area.

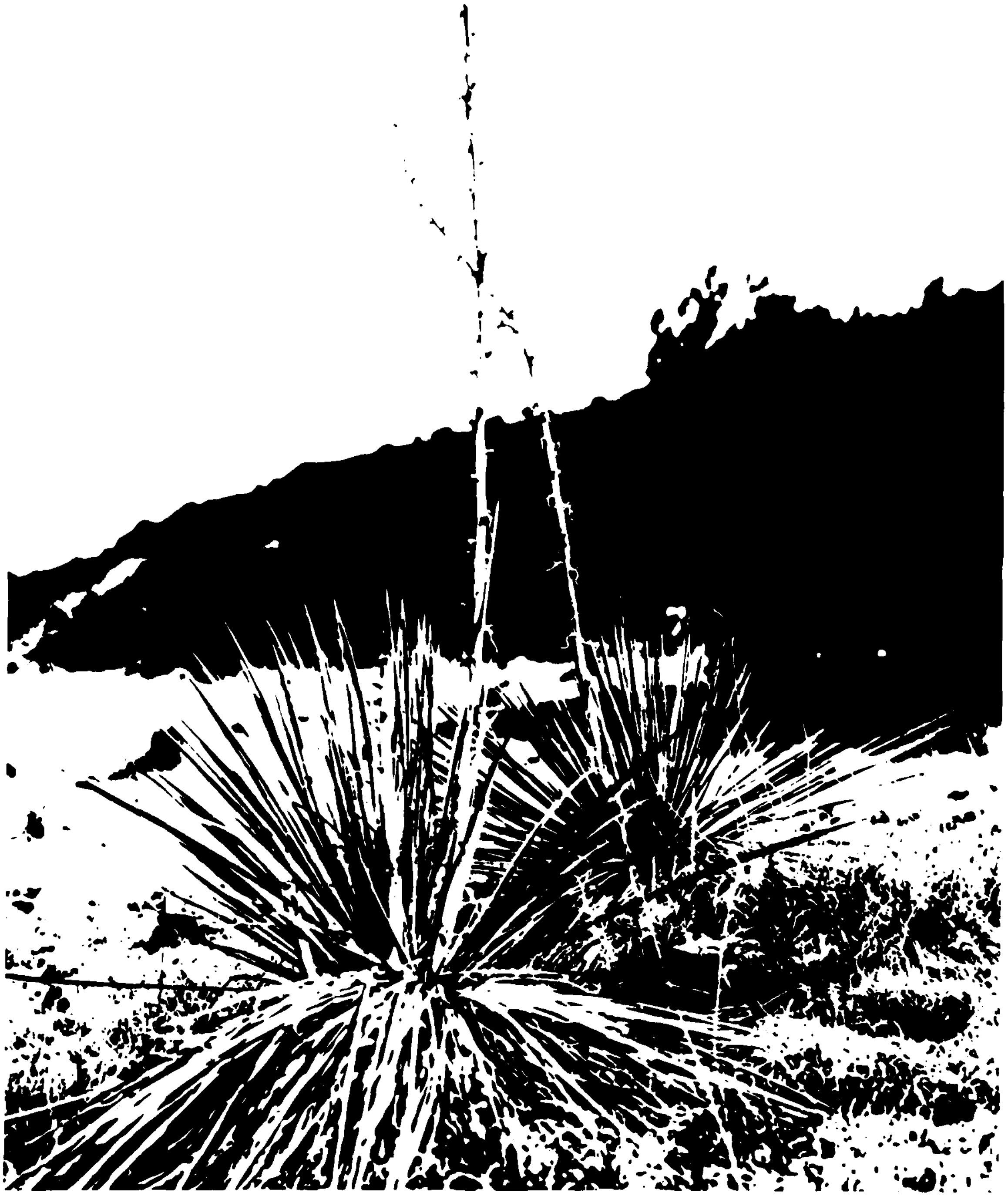
The first chapter of Section III will review the nature of archeological variability within the study area documented through research undertaken prior to the implementation of the Cochiti Reservoir Project, and the second chapter of that section will review the nature of historic settlement within the study area.

Chapters 3 and 4 of Section III present the methodology employed to survey the permanent and flood control pools of the reservoir during the course of the present project, and summarize archeological data gathered through that survey.

The final chapter of the volume will assess the significance of cultural resources within the reservoir boundaries through reference to the conceptual approaches developed in this chapter, and from the perspective of environmental and human behavioral variability documented for the study area as a whole.



SECTION II: ENVIRONMENTAL SETTING



II.1
Geology and Prehistoric Mineral Resources: White Rock Canyon and the Cochiti Study Area, Sandoval County, New Mexico

A.H. WARREN

INTRODUCTION

A study of the geology and mineral resources of White Rock Canyon and adjoining areas was undertaken in the spring of 1975 in conjunction with archeological investigations of the Cochiti Reservoir Project, Office of Contract Archeology, University of New Mexico. This report deals primarily with the nature and location of geologic and mineral resources and their utilization by prehistoric and historic inhabitants of White Rock Canyon. Landforms, as related to settlement patterns and land usage, are also discussed.

Field work was conducted over a period of ten days during April and May, 1975. Observations were concentrated upon those geologic features which would be of primary concern to the early inhabitants. These include: topographic settings which would be suitable or desirable for various cultural activities; outcrops of rocks and other mineral resources which might be utilized by the early people; recent stratigraphy and soils which might indicate past climates; evidence of utilization of mineral and other resources by the former occupants; and the nature and distribution of both water and land resources.

PREVIOUS INVESTIGATIONS

Early geologic work in this area includes a report on the geology and ore deposits of the Bland and Cochiti mining district by Graton (Lindgren *et al* 1910). In 1940, Denny described sedimentary rocks in the northern end of the canyon. Kelley (1948) described the general geology of the area in an unpublished report of the pumice deposits of the Pajarito Plateau. Emmanual (1950) dealt with the geology and geomorphology of White Rock Canyon. A detailed study of the upper part of White Rock Canyon was published by Griggs (1964), while the general geology of the area is included in the Geologic Map of the Jemez Mountains (Smith *et al* 1970).

Currently the U.S. Geological Survey is carrying out additional research in White Rock Canyon for the purpose of integrating the stratigraphy and chronology of the area into an overview of the Cenozoic geologic history of the Middle and Upper Rio Grande Valley.

Numerous unpublished reports concerning the mineral resources of the prehistoric people in the nearby Cochiti area were prepared by the author during the past ten years as part of the Museum of New Mexico's Cochiti Dam Archeological Salvage Project (Warren 1967a, 1967b, 1967c, 1968, 1974). Information within these reports has been drawn upon during the current investigations.

SETTING

White Rock Canyon is a deep basalt-rimmed gorge, about 20 km in length, carved by the Rio Grande during the past one to two million years. To the south is the Santo Domingo Valley and to the north, the Espanola Valley. The canyon lies on the southeastern flank of the volcanic peaks of the Jemez Mountains and separates the Pajarito Plateau on the west from the basalt mesas of Cerros del Rio on the east. The Rio Grande enters White Rock Canyon below Otowi Bridge and emerges from the canyon about 3.6 km north of Cochiti Pueblo (see Fig. II.1.1).

White Rock Canyon has been cut by the modern Rio Grande through basalt flows of the Cerros del Rio and is bordered along most of its length by high lava cliffs, talus slopes and landslide debris. The canyon walls rise to heights of approximately 1000 ft (305 m) above the river.

The lava mesa of the Cerros del Rio borders White Rock Canyon on the east. The mesa has two levels formed by basalt flows and cones of two different geologic periods. Farther east across the Santa Fe Plain can be seen the high peaks of the Sangre de Cristo Mountains.

West of White Rock Canyon and the Pajarito Plateau are the volcanic peaks of the Jemez Mountains. Near the center of the mountains is the Valles Caldera, 22 km in diameter, which is one of the largest calderas in the world. The eastern edge of the caldera is rimmed by the high peaks of the Sierra de los Valles, often referred to as the Valles Mountains. The Pajarito Plateau, capped by rhyolite-welded tuff, forms an east sloping apron of the Valles Mountains. Erosional channels, flowing eastward to the Rio Grande, have cut many narrow deep canyons into the plateau surface resulting in digitate mesas or "potreros" which are capped by cliffs of pinkish-tan colored Bandelier Tuff.

Drainage tributaries to the Rio Grande on the west side of White Rock Canyon are intermittent except for Rito de los Frijoles: Some carry small amounts of water in their upper reaches and a few springs are dependable as water sources. For example, water in Rio Chiquito (Cochiti Canyon) is presently being used to irrigate apple orchards.

Short deep canyons have cut the high mesa of Cerros del Rio, but none contain permanent water flow. The Rio Grande itself has an average flow of 1682 cubic feet per second at Otowi Bridge (Griggs 1964:89).

Altitudes in White Rock Canyon range from 5280 ft

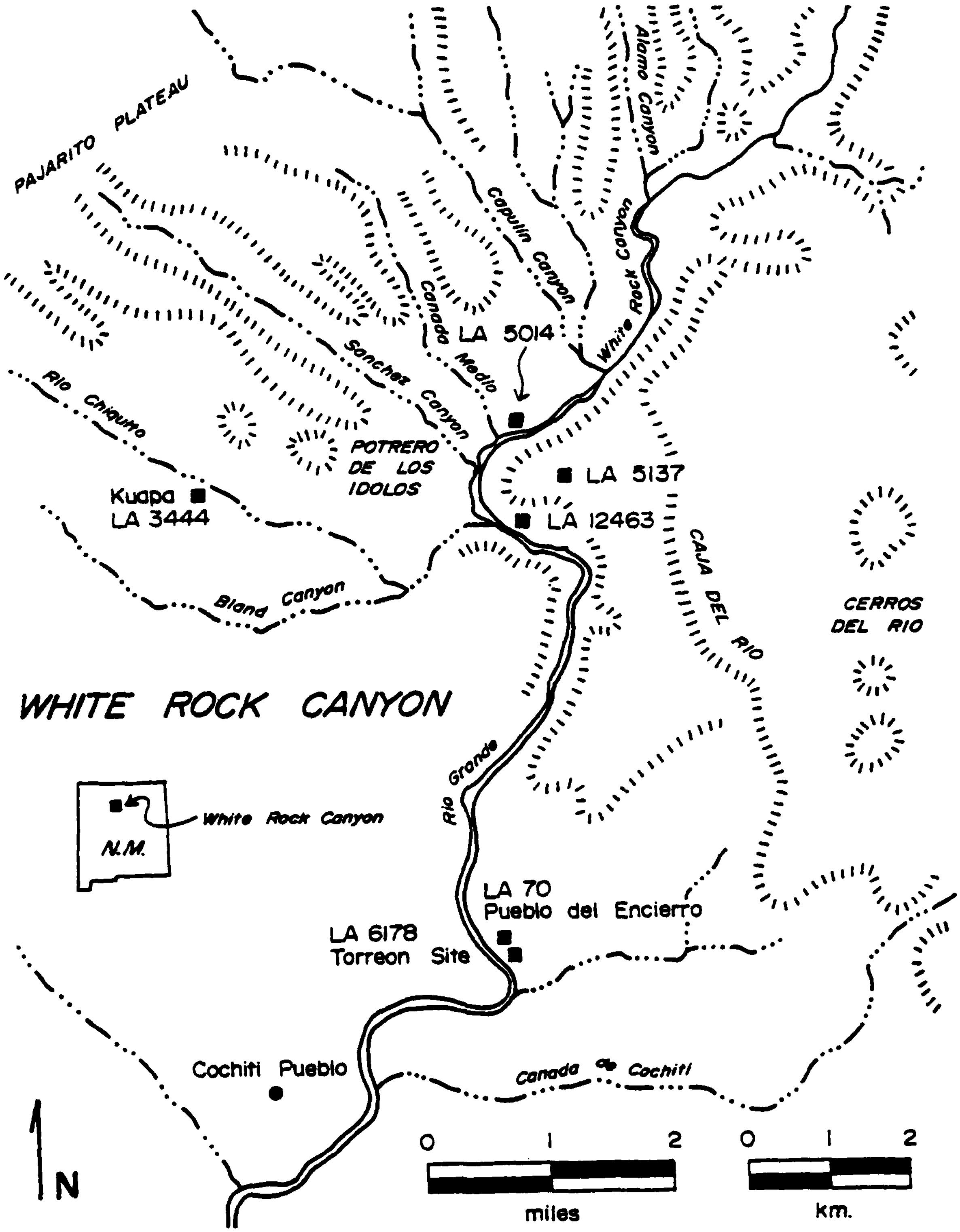


FIG. II.1.1 White Rock Canyon and Vicini^ty

(1609 m) at Cochiti Dam and 5460 ft (1665 m) at Sagebrush Flats in its upper reaches to over 7300 ft (1225 m) on the Cerros del Rio and 6400-8000 ft (1950-2438 m) on the Pajarito Plateau. The volcanic peaks of the Sierra de los Valles have altitudes ranging between 10,000 and 11,000 ft (3048-3353 m). The relief in White Rock Canyon ranges from 1000 ft (305 m) to 400 ft (122 m) or less in tributary canyons.

Rainfall in White Rock Canyon averages 10 to 12 inches (250-300 mm) annually, according to isohyetal analysis maps prepared by the U.S. Weather Bureau. Precipitation is greater in the summer months than in the winter. On the Pajarito Plateau, annual rainfall ranges up to 16 inches (410 mm), but a similar increase is not noted on the Cerros del Rio. The climate is generally mild.

THE ROCKS OF WHITE ROCK CANYON

The general sequence and description of rock units in White Rock Canyon is summarized in Table II.1.1 and is diagrammed in Fig. II.1.2.

The oldest sedimentary rocks exposed in White Rock Canyon belong to the Santa Fe Group (late Tertiary) and include an unnamed lower undifferentiated unit of arkosic sand, silt and gravel exposed in the northern 3.7 km of the canyon; the Totavi Lentil of the Puye Conglomerate; and the Puye Conglomerate (Griggs 1964).

The Totavi Lentil was deposited by a large river, ancestral to the Rio Grande, and is composed of silt, sand, clay and cobbles of granite, chert, schists, metarhyolite, quartzite and volcanic rocks. The chert cobbles include: Pedernal-like chalcedony and chert; olive brown chert of Pennsylvanian age; cream colored, sometimes fossiliferous, chert; and cherty metarhyolite. The chert cobbles are well-rounded; the latter two types may have thick yellow cortices. Quartzites may be white, gray, red, yellow or tan. Metamorphic rocks include amphibolite, phyllite, sillimanite and quartz-mica schist, and gneissic granite. White rock quartz, of the type used for "lightning stones," is present. Volcanic rocks are usually light to medium gray in color.

The silt and sand of the Totavi contribute to colluvial slopes and channel material, and are probably also reworked by wind. Lenses of clay, gray to red in color, have been noted in several areas. At one locality on the east side of the Rio Grande, the clays and sands of the Totavi Lentil have been baked and faulted, presumably during volcanic activity.

Basalt flows from the Cerros del Rio coursed to the west at one interval during the deposition of the axial gravel of the Totavi which forced ancestral Rio Grande 2.0 to 3.5 km west of its present position. The basalt also formed some dams along the river resulting in the deposition of lake clays, such as are found in the central part of the canyon. A deposit of diatomite, across the Rio Grande from the mouth of Alamo Canyon, probably was formed at this time.

The Totavi Lentil crops out under, and is occasionally interbedded with, the basalt flows of the Cerros del Rio. On steep talus slopes, the axial gravel and sand is usually obscured by the basaltic debris. In some areas, however, the gravel has been exhumed and the rounded hills and ridges give the appearance of old river terraces.

The Puye Conglomerate, a fan deposit composed of early volcanic rocks of the Jemez Mountains, was set over the Totavi Lentil. There are no outcrops in White Rock Canyon; however, the unit may be found in tributary canyons on the Pajarito Plateau where it contributes material to present day drainages.

Volcanic rocks of Tertiary age are confined to the basalt flows which cover, or are interbedded with, the Totavi Lentil. The basalts were extruded on the east side of the canyon and formed the Cerros del Rio. The basalt flowed across that area which is now occupied by the Rio Grande; however, subsequent faulting allowed the river to return to its present course.

Following the deposition and erosion of the basalt flows, the Otowi Member of the Bandelier Tuff (Pleistocene) was deposited upon existing erosional surfaces. The Otowi was formed by an air fall of white pumice fragments. There are numerous outcrops of the pumice along the canyon walls, generally close to the top of the basalt cliffs. Only one outcrop of the Tshirege Member of the Bandelier, the upper cliff forming rhyolite, occurs east of the Rio Grande. To the west, the Tshirege Member caps the high narrow ridges of the Pajarito Plateau beyond the basalt cliffs of the White Rock Canyon. Weathering of the rhyolite has a tendency to form small caves on the face of the cliff, which early inhabitants enlarged and used as dwellings.

Sedimentary rocks of Pleistocene age include landslide debris composed mainly of basalt clasts. Throughout the canyon, landslide areas have formed benches and ridges of varying heights above the river. Soils, composed mainly of colluvium and windblown sand which filled the hollows created by the landslides, have formed on many of the benches. Landslides may have continued up to the present time, since rubble piles of basalt blocks, without subsequent fill by finer materials, occasionally occur. One such recent fall is located at the mouth of Medio Canyon.

Pyroclastic debris, composed of large boulders of glassy basalt, obsidian nodules, cinders and volcanic bombs, occurs on the higher mesas bordering White Rock Canyon. This debris is, in turn, covered in many places by large dunes or blankets of popcorn pumice. The dunes often give the appearance of being quite fresh and uneroded, but this partly may be explained by the work of burrowing animals which has brought fresh popcorn pumice to the surface of the dunes. Also, in many areas, the pumice has been mixed with colluvium and aeolian sand or redeposited by flowing water. The pumice deposits occur within White Rock Canyon as well as on the eastern slopes of the higher surfaces. The pumice, which was deposited as an air fall, may correlate with the El Cajete Member of the Valles Rhyolite (Pleistocene) which dates a little over 42,000 B.P. (Bailey *et al* 1969:18).

When exposures are present, the pumice was deposited over a reddish tan soil with a platy K-horizon which developed on an eroded surface of the Otowi Member of the Bandelier Tuff. A younger reddish brown paleosol, with a moderate carbonate accumulation, later developed in sand dunes. It is very probable that the pumice fall preceded a period of aeolian activity and dune formation in that area peripheral to the Jemez Mountains. These dunes, and subsequent younger sand dunes, are the locales of many prehistoric occupations from early

Archaic to late prehistoric time.

The stratigraphy of sand dunes in White Rock Canyon was poorly exposed except near the pueblo site of LA 5014 (at the mouth of Medio Canyon) where trenching revealed an older reddish brown soil over the pumice deposit. A grayish brown soil, formed in colluvium and wind blown sand, occurs above the reddish-brown soil. Many archeological sites were recorded on the surface of this soil in White Rock Canyon and in neighboring areas. The reddish brown paleosols may date to late Pleistocene; however, the grayish brown unit is un-

TABLE II.1.1

GENERAL SEQUENCE OF ROCK UNITS IN WHITE ROCK CANYON
(Modified from Griggs 1964; Bailey *et al.* 1969, and others)

AGE	FORMATION	DESCRIPTION
Holocene	Sand dunes	Aeolian sand, fine-grained, unconsolidated, tan colored; above two paleodunes with weak carbonate accumulations and some induration
	Colluvium	Sand, poorly sorted, with pebbles and basalt fragments; derived mainly from Totavi Lentil of Puye Conglomerate; may be mixed with aeolian units
	Talus, rock fall, landslide debris(?)	Basaltic rocks and cinders; from flows and debris of Cerros del Rio basalts
	Alluvial fans and channel deposits	Sand, angular to rounded gravel, from Jemez volcanics and Cerros del Rio basalts
Pleistocene	El Cajete(?) Pumice	Popcorn pumice; white and rounded fragments of crystal pumice in dunes and blankets
	Fanglomerate and pyroclastic debris	Basaltic rocks, glassy basalt, obsidian nodules, cinders volcanic bombs; thin surface scatter under pumice dunes; some fan deposits
	Landslide debris	Basaltic rocks and fragments, from Cerros del Rio flows; possibly over some Totavi Lentil sand and gravel
	Bandelier Tuff: Tshirege Member	Welded rhyolite tuff; cliff forming; weathers tan or light orange
	Otowi Member	Pumice, white, fine to coarse fragments; poorly consolidated; weathers tan; forms tent rocks
Late Pliocene	Puye Conglomerate	Fanglomerate, coarse angular boulders, sand, derived from early Jemez volcanics; partly consolidated; may form cliffs; above Totavi Lentil
	Totavi Lentil (of Puye Cg)	Axial gravel of ancestral Rio Grande; light tan sand, silt, clay, and well-rounded cobbles of quartzite, chert, granite, and volcanic rocks
	Cerros del Rio Basalt	Basalt and basaltic andesite flows; interbedded with Totavi Lentil; above Otowi pumice; post-basalt lake clays

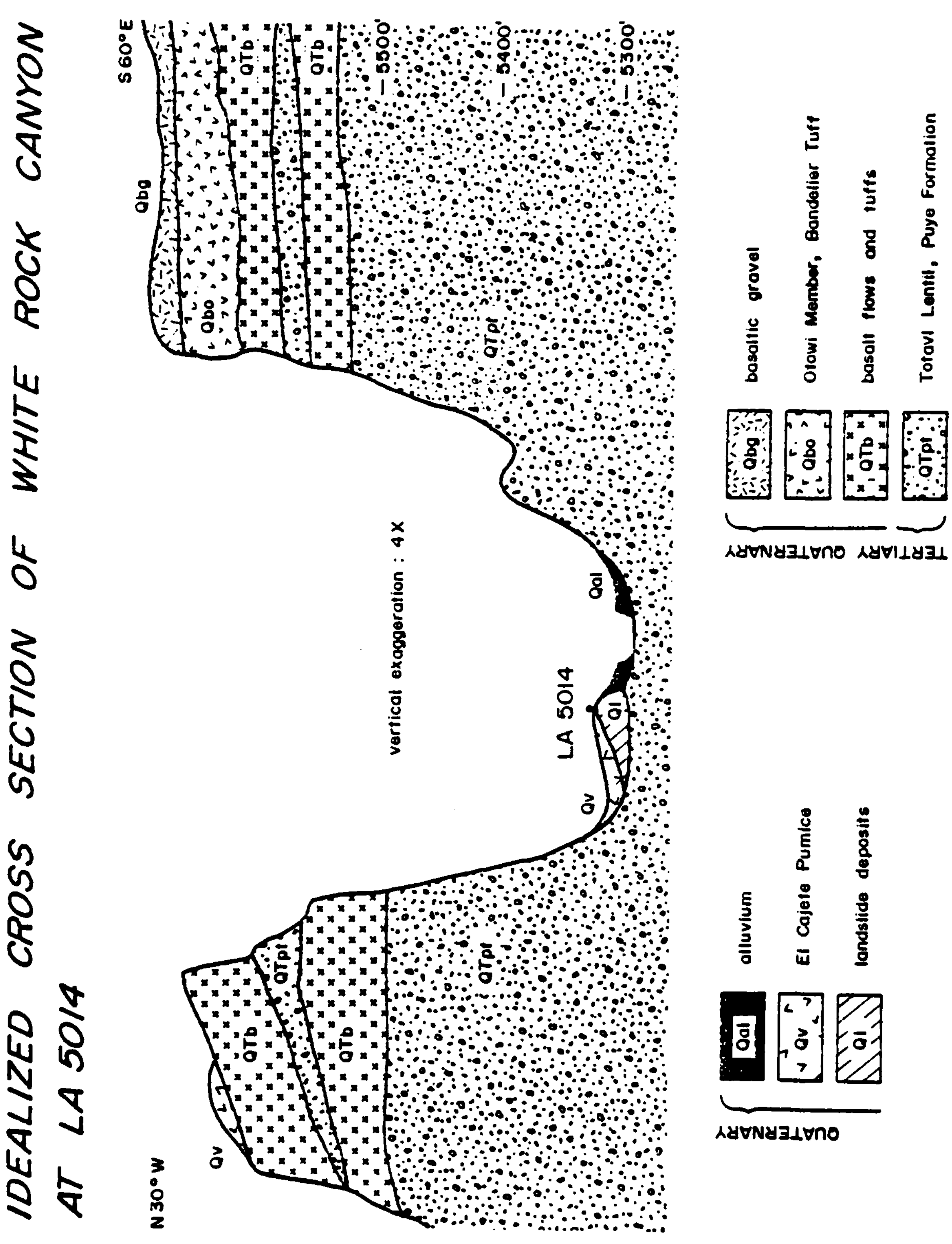


FIG. II.1.2 Idealized Cross-section of White Rock Canyon at LA 5014 Showing Geologic Formations

FIG. II.1.3 View of Southern Pajarito Plateau, taken from the east side of White Rock Canyon (Cerros del Rio). Sanchez Canyon is the trough in the center of the picture.

FIG. II.1.4 Bottom of Santa Cruz Arroyo, looking northeast toward La Bajada escarpment

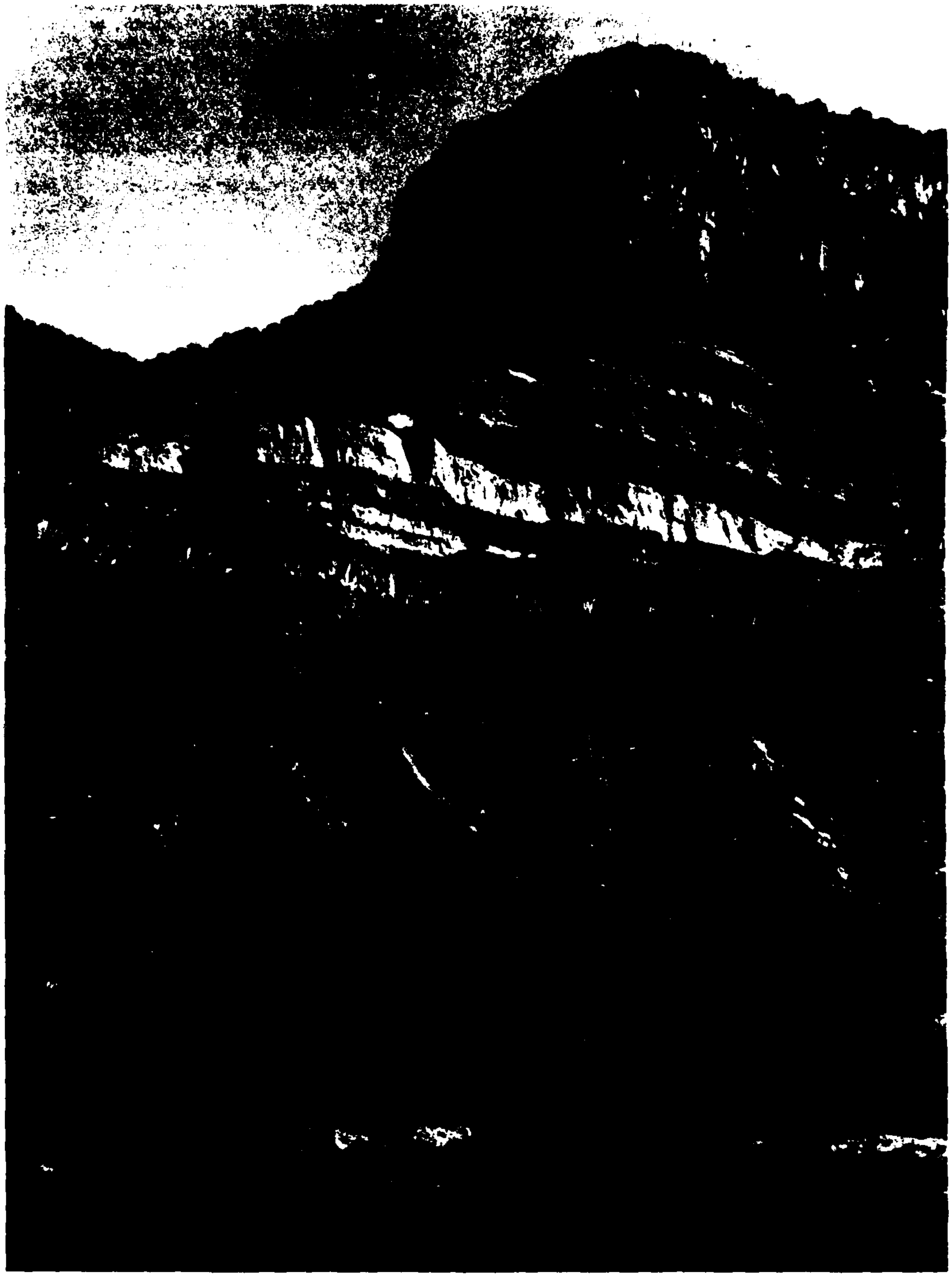


FIG. II.1.5 West side of Rio Grande near the mouth of Capulin Canyon

doubtedly of Holocene age (see Figure II.1.6).

Sandy to pebbly colluvium, often mixed with wind blown sand, forms slopes along the narrow valley floor of White Rock Canyon. Much of the colluvial material appears to be derived from the Totavi Lentil channel sand and gravel which underlies the basalt flows along the river. The same soil sequence as noted for the sand dunes, occurs in these colluvial deposits. Small scarps along the edge of the river channel are characteristic of the soils; the proximity of the scarps to the river is an indication of the general absence of lateral movement of the Rio Grande channel during the past few thousand years.

Other Holocene deposits in White Rock Canyon include alluvial fans of tributary canyons, channel sand and gravel, rock fall and talus (mostly of basalt clasts) and recent landslide debris. The talus slopes are often sites of temporary rock shelters for prehistoric travelers in the canyon. Breaks in the basalt cliff, due to landslides or rock falls, often mark the point of entry of ancient foot trails or roads.

GEOLOGIC AND MINERAL RESOURCES OF WHITE ROCK CANYON

Selection of Occupation Sites

Evidence of occupation and use of the land resources of White Rock Canyon from late Archaic (ca. 800 B.C.-A.D. 400) into the twentieth century is present throughout the area. Camps often were made on the sandy colluvium or dune areas along the narrow valley floor; and were most likely temporary or seasonal in nature. Masonry structures, often crudely made of basalt blocks, are found on stabilized floodplains or higher on the sandy colluvial slopes at the foot of the basalt talus. At least one pithouse (LA 12522) was excavated in the soft sand of the Totavi Lentil, a short distance up the talus slope.

The small soil-covered benches, formed in landslide debris, were favorite locations for workshop areas and petroglyph sites. Lithic scatters and the use of large basalt clasts for lapidary work suggest tool making sites. Small crude masonry structures might also be present on these benches; one larger adobe pueblo (LA 5014) is located on a landslide bench.

Small rock shelters are common on talus debris. A tumbled block of basalt may provide an overhang, protecting occupants from wind or rain. Usually crude walls of dry basalt masonry have been added for additional protection. Artifacts at most of these shelters are sparse, indicating brief or occasional use. One or two room shelters were sometimes built entirely of basalt fragments, often in a circular form and apparently without chinking; such structures occasionally took advantage of the wall of an overhang cliff. These shelters were probably used prehistorically for workshops or overnight camps; historic structures of this type often were utilized as corrals or pens for domestic animals.

Building Materials

The builders of pitrooms and kivas in White Rock Canyon took advantage of the sand deposits of aeolian and colluvial origin. As previously mentioned, one small site was located in a sand lens of the Totavi Lentil. The Cca horizon of carbonate accumulation within soils often produced enough cementation of sandy deposits to provide firm walls for rooms which were dug into the soil. This may have been the case at LA 5014: at least two superimposed soils were present on the ridge where the pueblo was built. Surface rooms at the pueblo were constructed of adobe which was taken from the lower reddish brown soil horizon, judging from the color of the adobe melt. In an area where unconsolidated sand and gravel predominates, the Cca horizon of soils provides the most cohesive material for adobe construction.

For masonry construction, angular and slabby basalt clasts provided an abundant supply. The awkward and uneven shapes of the rocks would not appear to be highly suitable for masonry structures; however, the large number of standing walls suggests that basalt clasts also must have some enduring cohesiveness. Walls, some a meter or more in height, are still intact centuries after they were built; and extensive networks of rock walls, such as those constructed at LA 9138, are prominent architectural features throughout the canyon.

Basalt clasts were also utilized for building terraces across small arroyos within the canyon and upon the mesa tops. These terraces are generally closely spaced, often no more than a meter apart, but with considerable lateral extent and, at present, have little apparent soil between the rock walls. Many of the terrace systems have been breached by the arroyo channel subsequent to construction.

Petroglyph Sites

An important use of basalt boulders is the production of rock art. The basalt boulders, which when weathered produce a dark brown glossy desert varnish coating, make ideal backgrounds for the pecked and scratched petroglyphs as found within White Rock Canyon. On a fresh break, the basalt has a medium gray color; however, with weathering, the gray surface gradually turns to tan and then shades into the darker browns which are characteristic of the varnish. The rate of production of the desert varnish is unknown. A 1939 petroglyph did not show signs of varnish production, yet most prehistoric petroglyphs exhibit varying degrees of patina within the pecked areas.

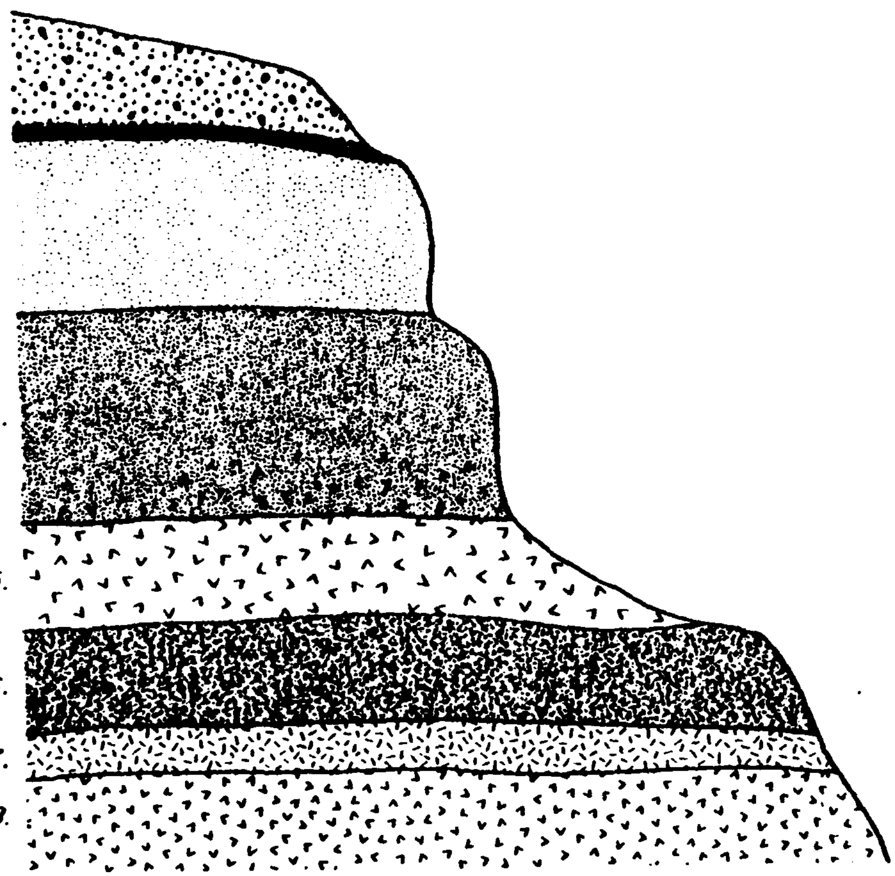
Concentrations of petroglyphs are found in numerous places along both sides of the river. The sites are often located around grassy open areas on landslide benches, occasionally on hill crests; sheltered downwind areas seemed to be preferred. Lithic scatters, indicating refining workshop areas, frequently occur in the immediate vicinity of petroglyphs, and lapidary stones on basalt blocks are usually present.

Resource Materials for Ceramics

1. Sources of Clay

The Totavi Lentil of the Puye Conglomerate (late Tertiary) outcrops throughout the length of White Rock Canyon. Occasional beds, or pockets of clay, occur within deposits of sand and fine gravel. Red plastic clay was collected in proximity to LA 10108 on a talus slope below basalt cliffs on the west side of White Rock Canyon near its mouth. A deposit of gray clay, also in axial gravel, was found on a ridge at the foot of the Potrero de los Idolos. A small extrusion of plastic clay is located

IDEALIZED CROSS SECTION OF HOLOCENE AND LATE PLEISTOCENE DEPOSITS IN THE WHITE ROCK CANYON AREA



EXPLANATION

1. Recent unconsolidated tan-colored sand of colluvial and aeolian origin, occasionally capped by an organic crust.
2. Cultural horizon containing hearths, charcoal stained sand, fire-cracked rock, flakes and artifacts.
3. Paleosol with weak calcium carbonate accumulation; grayish brown sand; white flecks of carbonate; slight cementation.
4. Paleosol: reddish brown; calcium carbonate accumulation weak; with columnar structure; sand, silt, scattered pebbles of pumice; may grade downward into popcorn pumice.
5. Popcorn pumice airfall (El Cajete Member of Valles Rhyolite ?)
6. Paleosol: reddish brown, often hard and clayey, has platey carbonate horizon or K-horizon.
7. Basalt clasts: pyroclastic, to boulder size, may be resting on layer of indurated clay.
8. Otowi Pumice (Qbo) member of the Bandelier Tuff.

FIG. II.1.6 Idealized Cross-section of Holocene Sand Dunes and Colluvium and Late Pleistocene Deposits in White Rock Canyon

in channel (?) alluvium at the southeast end of the ridge on which Kuapa (LA 3444) is located. None of these samples have been tested for ceramic qualities.

Basalt flows of the Cerros del Rio caused damming of the river and the deposition of lake sediments. At a type locality on Culebra Hill, Kelley (1948) measured almost 50 feet of greenish gray to light gray plastic clay of commercial value. Within White Rock Canyon, lake beds are exposed in the vicinity of Alamo Canyon; samples, however, were not collected at this outcrop, and lake beds have not been found south of this exposure.

2. Tempering Materials

Tempering materials which are indigenous to White Rock Canyon and its environs include: basalt scoria; fine-grained basalt; rhyolite-welded tuff; intermediate or andesite-welded tuff (various); andesite vitrophyre; crystal pumice; vitric tuff, and volcanic sandstone.

Basalt scoria is abundant on the Cerros del Rio mesa. Within the vicinity of the confluence of Bland Canyon and the Rio Grande, this material outcrops on both sides of the river. Basalt, suitable for tempering material, occurs within the lava flow and also in the pyroclastic rubble which is scattered on high surfaces along either side of the Rio Grande.

Welded tuffs, which were used primarily by Pajarito Plateau potters, occur in extensive outcrops as well as in fan gravel and channel alluvium. The welded rhyolite tuff was probably gathered from exposures of Bandelier Tuff; however, specific source materials have not been analyzed at this time. Andesite vitrophyre primarily was used as a tempering material for utility vessels within the Cochiti area, but a definite source has not been located.

Crystal pumice is abundant throughout White Rock Canyon, the basalt mesa of Cerros del Rio and on the Pajarito Plateau. Chunks of pumice were weathered out of the Bandelier Tuff units. Popcorn pumice of the El Cajete (?) Member of the Valles Formation can be obtained in almost any locality. Pumice was used as temper mainly during historic time, and throughout pre-glaze periods. If potters of the area used vitric tuff, this fact has not been substantiated; however, it or similar material could be obtained from finer fractions of the pumice falls of Bandelier Tuff Member. Temper analysis of Santa Fe Black-on-White sherds from Salt Bush Pueblo (LA 4997), Bandelier National Monument (Warren 1972), indicates that three types of temper were used by Santa Fe Black-on-White potters of the Pajarito Plateau: crystal pumice; colorless glass shards (vitric tuff), and brown glass shards (vitric ash ?). The utility wares from this site appear to have been tempered with either lithic tuff with rock fragments, quartz and feldspar, volcanic sandstone or channel sand. All materials are indigenous to the Pajarito Plateau.

The use of crystal pumice has been recognized in the 18th century historic pottery of the Cochiti area (Warren 1974). This material is still being used by Cochiti and Santo Domingo potters. One outcrop of pumice (Otowi Member of the Bandelier Tuff), along the road at Bland Canyon, has been used by Cochiti potters in recent years.

Preliminary observations of temper in mineral paint pottery, earlier than or contemporary with Santa Fe Black-on-White, do not show technological resemblance to the latter type. Crushed sherd appears more often as temper, although volcanic glass shards do occur in the mineral painted sherds.

3. Mineral Pigments

Mineral pigments for use in pottery making are not abundant in the White Rock Canyon area. Hematitic sandstone, which is suitable for red pigments, occurs at the base of many of the basalt flows. On the east side of the river, across from the mouth of Bland Canyon, burned or baked clays are found in pigments of red, yellow, gray and lavendar.

Lead ores, suitable for production of glaze paint, might have been obtained in the Cochiti mining district at Bland Canyon. Small amounts of galena have been reported from two mines in the district (Lindgren *et al* 1910). Lead ore for glazes could also have been obtained through trade from the Cerrillos district.

Additional research concerning ceramics from White Rock Canyon and the surrounding territory is necessary in order to locate pottery manufacturing villages and the utilized sources of clay, pigment and temper. White Rock Canyon may have provided raw materials for pottery making; however, at this time, quarries or mines are not known nor are the centers of manufacture of early or prehistoric pottery known and recorded.

Stone Tool Materials

The types of rocks and minerals which were utilized by prehistoric people in the White Rock Canyon and vicinity are listed in Table II.1.2. A high percentage can be obtained in White Rock Canyon from outcrops of ancient axial gravel of the Rio Grande, from the Jemez Volcanics, or from the basalts of Cerros del Rio. Although the variety of stone material is extensive, obsidian, glassy basalt, and Pedernal (?) Chert were the most common materials used; these materials could be gathered on the high surfaces on both sides of White Rock Canyon, from tributary or river gravel, or from landslide and talus debris.

Discarded stone materials, mainly flakes and rejected cores, are widespread throughout the area. Refining, or workshop areas, can be found wherever the source materials are exposed. Evidence suggests that in many areas within the canyon raw materials were carried upslope to a bench or hilltop where they were examined and refined. Since much of the chert was found in the Totavi Lentil, workshop debris includes hammers of quartzite cobbles which have been discarded after minor use.

Some of the more important or interesting lithic resources are discussed below. This discussion incorporates the use of a lithic code which has been developed by the author to systemize description of lithics and their source area(s) for New Mexico.

The code involves the use of a four-digit number for differentiating classes of lithic materials according to megascopically observable criteria of composition, texture, color and anomalous inclusions. The listing includes lithic materials of unknown as well as known sources. The statewide lithic resource type collection and files are located at the Laboratory of Anthropology, Museum of New Mexico; an additional type collection of

TABLE II.1.2

MINERALS AND ROCKS OF WHITE ROCK CANYON AND THE COCHITI AREA

CODE NO.	CLASSIFICATION	SOURCE
1011	Chert, cream colored, dull to waxy luster, small circular and crescentic fossils	As cobbles in the Totavi Lentil axial gravel
1030	Chert, black	Totavi Lentil and elsewhere
1040	Chert, green, cream	Brushy Basin Formation, San Juan County
1050-51	Chert, white, dull luster (1050); black mossy inclusions (1051)	Totavi Lentil; probably derived from Pedernal Chert outcrops
1052-53	Chalcedony, clear, colorless, waxy luster (1052); black dendritic inclusions (1053)	Chalcedonic variation of 1050-51
1055	Chert, white, quartz inclusions	Undetermined
1060	Chert, dark red (jasper)	Totavi Lentil and elsewhere
1070	Chert, yellow brown (jasper)	Totavi Lentil and elsewhere
1071	Chert, yellow brown, oolitic	Undetermined
1072-73	Chert, yellow brown to olive brown (1073); dendritic inclusions (1072)	Totavi Lentil; derived from Pennsylvania limestones
1075	Chert and chalcedony	Laguna, New Mexico
1090-91	Chert, white, red, black and/or yellow inclusions (1090); chalcedonic (1091)	Totavi Lentil; also Cerro Pedernal
1100	Silicified wood, yellow brown	Totavi Lentil (sparse); Jemez and Galisteo River Valleys
1110	Silicified wood, dark colors	Same as 1100
1112-13	Silicified wood, waxy luster, dark colors (1112); light colors (1113)	Jemez and Galisteo Valleys; and elsewhere
1140	Silicified wood, light colors, chalcedonic	Same as 1112-1113
1210	Chalcedony, mossy inclusions	Undetermined
1212	Chalcedony, abundant red and yellow mossy inclusions (moss jasper)	Totavi Lentil
1213	Chalcedony, banded, clear white, pale buff, black dendrites in fracture	Undetermined; Cochiti area, possibly Bland Canyon
1214-15	Chalcedony, clear, colorless, may grade to pink, milky white inclusions (1214); black inclusions (1215)	Tertiary fan gravel, Jemez River; Llano de Albuquerque
1221	Chalcedony with abundant mossy yellow inclusions (moss jasper)	Totavi Lentil, or tertiary alluvial fan gravel
1230	Chalcedony, clear with sparse red inclusions	Undetermined
1310	Chalcedony, clear uniform shade of yellow	Totavi Lentil; probably derived from Pedernal Chert outcrops
1340	Chalcedony, clear uniform shades of light brown	Same as 1310
1391	Opal, blue hyalite, botryoidal crusts	Cochiti or Jemez Sulfur mining district
1400	Chert, undifferentiated	Undetermined
1430	Chert and chalcedony, mossy red to colorless, light gray	Laguna, New Mexico

TABLE II.1.2 (cont.)

CODE NO.	CLASSIFICATION	SOURCE
1501	*Chert (jasperoid), cream, reddish brown, gray, banded or mottled,* brittle, waxy luster	*In rhyolite tuffs, Jemez* Mountains
1502	Jasperoid (metarhyolite?), gray porcelanoid, sparse phenocrysts	Totavi Lentil
2000	Sandstone, undifferentiated	Undetermined
2010	Sandstone, undifferentiated, fine-grained, indurated, massive	Undetermined
2020	Sandstone, fine-grained, well indurated, slabby	Undetermined
2030	Sandstone, fine-grained, indurated, tan	Totavi Lentil
2050	Sandstone medium to coarse grained, indurated, massive	Totavi Lentil
2090	Sandstone, hematitic, friable	At base of basalt flows in Totavi Lentil
2200	Sandstone, quartzitic, undifferentiated	Undetermined
2203	Sandstone, quartzitic, brown, red, red purple	Tertiary fan gravel, Jemez River
2250	Siltstone, indurated	Undetermined
2300	Conglomerate, quartzite cobbles	Totavi Lentil
2554	Claystones, red, yellow, gray, burned and hardened by heat of basalt	East wall, White Rock Canyon, near LA 12463
2710	Limestone, fossiliferous	Totavi Lentil (?)
2810	Diatomite, white, powdery	White Rock Canyon, across from Alamo Canyon
2850	Fossils, limestone	Totavi Lentil
2911	Concretion, limonitic	Undetermined
3000	Granitic rock, undifferentiated	Totavi Lentil
3020-30	Intermediate igneous, phaneric (3020); aphanite (3030)	Undetermined
3050	Basalt, very fine-grained ("trap")	Basalt flows, Cerros del Rio
3101	Granite, pink-orange inclusions	Totavi Lentil; Sangre de Cristos, Nacimiento Mts.
3150	Rhyolite, undifferentiated	Undetermined
3262	Augite latite	Cieneguilla, Los Cerrillos, fan gravel at La Bajada
3350	Gabbro	Undetermined
3400	Basalt, very fine-grained, sparse phenocrysts	Basalt flows, Cerros del Rio
3401	Basalt, fine-grained, tabular	Basalt flows, Cerros del Rio
3410	Basalt, very fine-grained ("trap"), conchoidal fracture	Basalt flows, Cerros del Rio
3430-31	Basalt, vesicular to scoriaceous, gray (3430); low density, highly vesicular (3431)	Basalt flows, Cerros del Rio
3432	Basalt, scoria, low density	Cochiti area
3500	Obsidian, undifferentiated	Undetermined
3510	Obsidian, black, waxy luster, opaque	Grants area

TABLE II.1.2 (cont.)

CODE NO.	CLASSIFICATION	SOURCE
3520	Obsidian, clear, brownish tinges, translucent, homogeneous	Jemez Mts.; high surfaces, White Rock, Borrego and Bland Canyons; elsewhere
3521	Obsidian, reddish brown tinges, swirls and bands	Same as 3520
3523	Obsidian, brown, opaque	Same as 3520
3524	Obsidian, brown, bands, streaks or flows, translucent	Same as 3520
3525	Obsidian, white inclusions	Valle Grande, Jemez Mts.
3526	Obsidian, green or greenish-black bands, opaque	High surfaces, White Rock Canyon
3530	Obsidian, light smokey gray, may be banded, small white to black inclusions	Polvadera Peak area, Jemez Mountains
3550	Obsidian	Red Hill area, New Mexico
3653	Pumice, popcorn, white, with crystals	El Cajete(?) Member
3655	Pumice, chunk, white, weathers, tan	Otowi Member, Bandelier Tuff
3700	Vitrophyre, black, dense,conchoidal fracture, undifferentiated	Undetermined
3701	Vitrophyre, basaltic (glassy basalt), vitreous luster, brittle: grades to fine-grained ("trap"), conchoidal fracture	Pyroclastic fragments, high surfaces, White Rock Canyon
3730-31	Vitrophyre, rhyolitic, glassy, welded, red, gray, white (3730); banded (3731)	Ash flow tuffs, Jemez Mts.; Totavi Lentil
3811	Rhyolite, ash flow tuff, partially welded	Bandelier Tuff; Jemez Mts., Pajarito Plateau
3812	Rhyolite, ash flow tuff, platy, welded	Pajarito Plateau; fan gravel: channel gravel
3813	Rhyolite, lapilli, welded	Same as 3812
3820	Andesite, ash flow tuff, moderately well indurated	Same as 3812
4000	Quartzite, white, red, gray, tan: well-rounded cobbles	Totavi Lentil
4001	Quartz, white, opaque; rounded rocks	Totavi Lentil
4301	Phyllite, satiny gray to balck; flattened pebbles	Totavi Lentil
4526	Greenstone, nearly black, massive; cobbles	Totavi Lentil
4531	Sillimanite quartz schist (fibrolite); cobbles	Totavi Lentil
4550	Schist, quartz mica	Totavi Lentil
5040	Gypsum, rock	Rosario (La Bajada)
5041	Gypsum, selenite	Rosario (La Bajada)
5110	Limonite, earthy, yellow brown	East wall, White Rock Canyon, near LA 12463; and elsewhere
5211	Hematite, hexagonal, silvery crystals	Undetermined
5220	Hematite, earthy, ochre	Same as 5110
5290	Jarosite, yellow to dark brown ochre	In sandstone, Cochiti Dam Site

TABLE II.1.2 (cont.)

CODE NO.	CLASSIFICATION	SOURCE
5300	Turquoise	Cerrillos, Santa Fe County; and elsewhere
5321	Malachite, in sandstone	La Bajada, Cerrillos, Nacimiento mining district; and elsewhere
5340	Epidote	Totavi Lentil
9999	Unknown material	

lithic resources occurring within the Cochiti Reservoir Project area is on file at the Office of Contract Archeology, University of New Mexico.

1. Obsidian

Obsidian not only was an important local artifact resource, but also has been the most widely traded material found within the Jemez Mountains. Small to large fragments of obsidian can be gathered on the surface of the high mesas on both sides of White Rock Canyon; river cobbles of obsidian are uncommon, but do occur.

The obsidian ranges from clear pale brown glass (3520); to streaky brown (3524); opaque with thin brown translucent edges (3523); and greenish black obsidian (3526). All varieties have the same geologic source which is similar to that of glassy basalt (3701).

Obsidian was used primarily for flaked artifacts such as arrowpoints and bifaces. Fresh flakes have exceedingly sharp cutting edges. Flaking areas are numerous wherever the obsidian nodules might be found.

A few fragments of obsidian are weathered out of the Otowi pumice (Bandelier Tuff), but most are too small to produce stone tools. A cobble of obsidian, about 10 cm in diameter, was found on a gravel bar along the Rio Grande; however, it probably was transported from another obsidian source farther up stream as the obsidian fragments of White Rock Canyon rarely exceed 5 to 6 cm. An outcrop of obsidian in Bland Canyon, south of "Old Kotyiti" (LA 295), has the same geologic context as the occurrences along White Rock Canyon. This particular deposit of obsidian is most likely scattered over a large geographic area.

2. Basalts

Several varieties of basalt occur in White Rock Canyon, including glassy basalt (3701); fine-grained trap rock (3410); scoria or cinders (3431); vesicular basalt (3430); and platy basalt (3401). Basalt, as discussed here, is defined as a dark colored, high density volcanic rock. Mineralogical variations are not considered.

Glassy basalt, or basalt vitrophyre (3701), is dark gray to almost black; it has a vitreous luster on a fresh surface. This basalt flakes easily, has a conchoidal fracture and produces sharp cutting edges. The material was used for flaked tools, choppers, hammerstones, axes and picks. The outer surface, or cortex, is dull gray and pitted, similar in appearance to unfractured obsidian fragments. Frequently only the higher specific gravity can distinguish it from obsidian without fracturing it.

The fragments of basalt are found mainly on the high surfaces on either side of White Rock Canyon and are associated with obsidian nodules, volcanic bombs and other basaltic debris. It is overlain in places by popcorn pumice (El Cajete Mb?). The material was emplaced by ejection from a volcanic vent; however, some fragments have since been moved by water and rock fall as they are found on talus slopes and gravel bars along the river.

Occasional phenocrysts of pale yellow-green or yellow-brown pyroxene grains, up to 2.0 mm, are scattered throughout the ground mass. Microscopically, the crystals are pale yellow to pale brown hypersthene and pale green diopside (?) set in light brown glass; the glass contains abundant felted crystallites which often show flow structure (Warren 1974). The rock is similar to the glassy andesite as described by Bryan and Butler (1937) from San Antonio Mountain in northern New Mexico. The indices of refraction of Bryan's andesite are slightly lower than that of the Cerros del Rio basalt which suggests that the latter may be more basic. Glassy basalt is found in other areas within New Mexico, including Catron and Valencia Counties.

Extensive flaking areas, or quarries, were first described on a basalt mesa northeast of Pueblo del Encierro (LA 70) (Warren 1966). Other quarry sites can be found throughout White Rock Canyon and on basalt mesas. Many of the discarded flakes may be of considerable antiquity as the flaked surfaces have become dulled by weathering. Flakes associated with pueblo ceramics are still fresh and vitreous.

Vesicular basalt (3430), one of the varieties of the Cerros del Rio basalts, is generally found in surface flows; it has a gray color and a high density. It also may be found on talus slopes and in stream gravel. The material was utilized for various grinding tools, such as manos, metates and abraders. The natural cavities allowed continued use without the need for pecking the surface. Basalts, with different sized vesicles, were used to prepare sets of manos for varying degrees of fineness when grinding.

Basalt scoria is much lighter than vesicular basalt. The material is earthy red to reddish gray in color. In addition to extensive use as a tempering material, scoria was used to carve various ceremonial effigies by the Cochiti Indians (Lange 1959:144); stone balls, mortars, stone rings, pipes and other carved objects have been found at

archeological sites.

Fine-grained slabby basalt can be found near the base of basalt flows and most likely was mined in place at these outcrops. The slabs were used for "piki," or cooking stones; "pun-ku," or ringing stones; palettes and paint stones; laps; and in construction.

Fine-grained trap rock was quarried from basalt outcrops probably to produce large flaked tools. The material is coarser than glassy basalt, but can be fashioned into tools.

An interesting workshop found within White Rock Canyon (LA 12509) produced several dozen rejected axe "blanks" of basalt with more or less rectangular fracture. The long rectangular basalt fragments were all notched, possibly a first step in producing an axe or pick, but then were discarded. A well-fashioned whetstone of fine-grained massive sandstone was also recorded at this workshop.

3. Chert and Chalcedony

The most abundant chert, found in old axial river gravel, resembles chert from Cerro Pedernal. However, if it is derived from this provenience, there were probably minor lateral variations. Most of the chert and chalcedony is white to clear (1050; 1052), or with black dendritic inclusions (1051; 1053). Other color variations include: white, red, black, and/or yellow inclusions (1090-91) and chalcedony with shades of yellow (1310) or light brown (1340).

The chert occurs as well-rounded cobbles in the gravel outcrops; flaking areas are associated with these gravel occurrences. The chert is one of the three most predominant lithic materials found at sites in White Rock Canyon. Arrowpoints, scrapers, drills, bifaces and hammerstones were common tools produced from the chert.

A cream colored fossiliferous chert (1011), gray cherty metarhyolite (1502) and olive brown jasper (1072-3) also occur as cobbles in the axial gravel of the ancestral Rio Grande. The cream colored chert may be from the same source as fossiliferous chert which is found along the San Juan River in northwestern New Mexico.

Jasperoid, silicic rocks (1501) in the rhyolites of the Jemez Mountains, are colorful; however, this material is often too brittle to produce serviceable artifacts. Colors include: orange-pink; reddish brown; yellowish brown, and gray. Banding and mottling are common characteristics. The jasperoids were formed by hydrothermal replacement of the rhyolites in mineralized districts, such as Colle and Bland Canyons.

4. Quartzite

Quartzite cobbles (4000) occur in great abundance in the ancestral river gravel; they were extensively used for manos, crude hammers and cobbles. White rock quartz (4001) was utilized by the Pueblo Indians to make sets of "lightning stones" or "glow stones." If two of the white cobbles are rubbed together in the dark, a bright yellow glow is produced. The property of luminosity, when rubbed, is called triboluminescence; this remarkable discovery by the early Pueblo Indians in the Rio Grande Valley is described by Frondel (1962: 136) in "Dana's System of Minerology."

5. Diatomite

Diatomite is a white very fine-grained powdery rock which is composed of the opal frustules of single cell plants. Fragments of diatomite had been found in archeological excavations within the Cochiti area (Warren 1974); however, its source was not located until the spring of 1975, when an outcrop of white rock was examined across the river from the mouth of Alamo Canyon. One storeroom in a historic house (LA 34) of the Spanish Colonial period had been plastered with diatomite. Prehistoric use, however, remains unknown, though a Pueblo Indian suggested that it was used to whiten buckskin. Another possibility might have been as a silica additive in the production of glaze paint, since diatomite is incorporated in the modern production of glazes and enamels.

6. Hematite

Hematite, the most common pigment used by early man, occurs in several forms in White Rock Canyon. Hematitic sandstone (5220) can be found under many of the basalt flows where the heat from the molten basalt has oxidized the sandstone. On the east side of the Rio Grande from the mouth of Bland Canyon, clays and sand of the Totavi Lentil have been baked by the heat of volcanic intrusives. This process has produced clayey pigments of red, yellow, lavender and gray hues which break into compact indurated fragments suitable for use as crayons. Evidence of two or three quarrying, or gathering sites, were noted at the base of a cliff.

Specularite, a micaceous silvery variety of hematite, has been reported from the Cochiti mining district. Silvery hexagonal platy crystals (5211), from 1 to 2 cm in diameter, have been found at archeological sites in Bland Canyon; however, it remains uncertain whether its source is the Cochiti district.

7. Malachite

When malachite occurs in sandstone (5321), it is used as a green pigment. This material was noted at sites in the White Rock Canyon vicinity. Malachite is a green copper carbonate which has been mined and used extensively by both prehistoric and modern Indians as a pigment for beads, pendants and other ornaments. Within recent times, Zia Pueblo Indians are known to have traveled to mines in the Nacimiento district to gather the mineral. Malachite occurs in several other mining districts: one prospect in the Cochiti District; at La Bajada; Jemez Springs, and Cerrillos. Arrow shafts, recovered from an open volcanic pipe on the Cerros del Rio basalt mesa, were still coated with green paint made from malachite (Warren laboratory notes).

8. Opal

Opal, an hydrous silicon dioxide, occurs in numerous locations in the Cochiti mining district. A fragment of translucent vitreous opal (hyalite, 1391), with blue color, was noted at a Santa Fe Black-on-White site in Bland Canyon near its confluence with the Rio Grande. The mineral may very well have been a turquoise substitute.

9. Pumice

Pumice (3655) was a favorite material for carving miscellaneous stone objects. The pumice occurs as large chunks, often in channel alluvium. It is light weight and easy to carve. Most of the large fragments are from the Otowi Member of the Bandelier Tuff.

Pumice is a light colored highly cellular volcanic glass. Used to make socio-religious objects, the pumice also was utilized by Pueblo potters as temper in Santa Fe Black-on-White and Galisteo Black-on-White vessels; it was adopted by Spanish citizens and Pueblo potters of the historic period as tempering material.

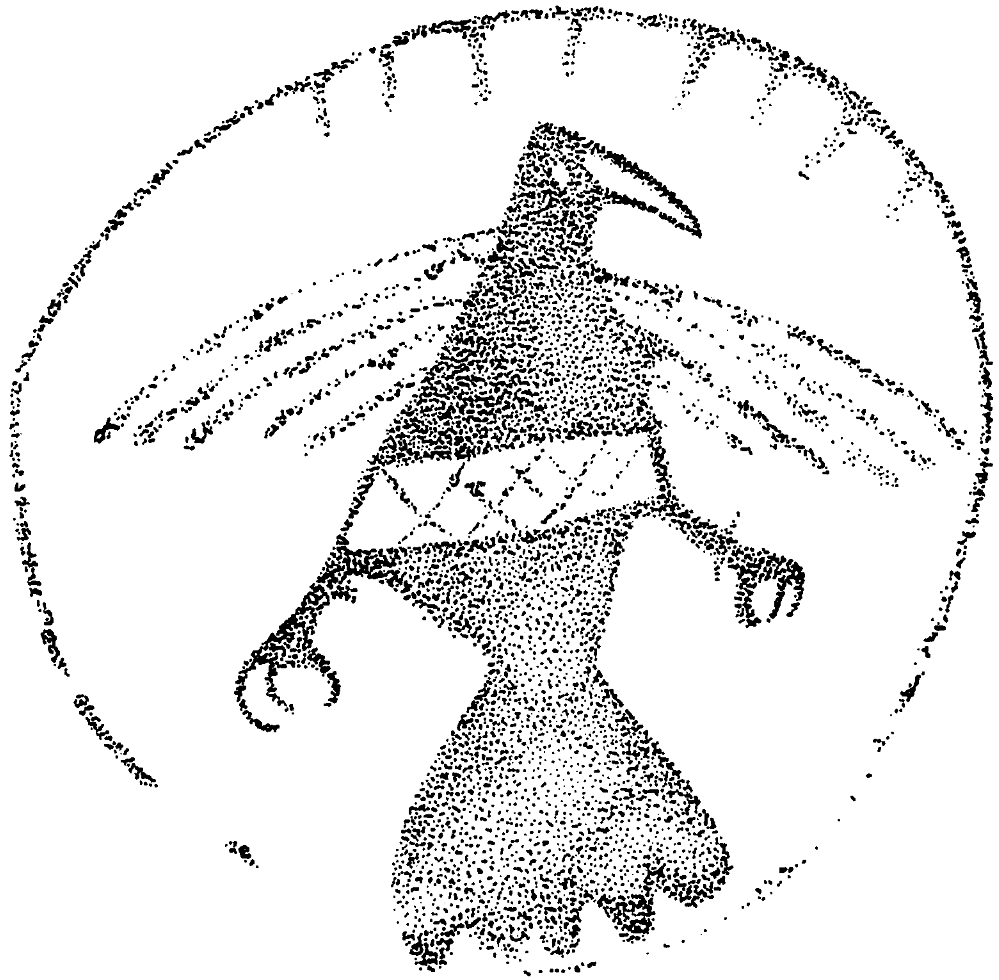
10. Schist

Schists of varied mineral composition occur in the axial gravel and includes quartz mica schist (4550), which was used by some potters for tempering utility pots; greenstone (4526), a favorite rock for polishing stone; phyllite (4301), black and satiny, common for small carved "medicine" stones; and sillimanite schist (4531) or fibrolite, utilized for making axes.

SUMMARY AND CONCLUSIONS

The data contained within this report on the geology and mineral resources of White Rock Canyon provides a meaningful perspective for the understanding of land use of the area during prehistoric and historic periods. Field reconnaissance of the canyon contributed a great deal of information concerning the "land between," a rugged inaccessible canyon which in the past had been visited by prehistoric Indians, Spanish pioneer colonists, a few ranchers, and an occasional backpacker or river runner.

Far from being a "no man's land," White Rock Canyon has been a busy and economically productive area for many human groups throughout the millenia. Centers of population were numerous on the Pajarito Plateau and the Cerros del Rio; however, the canyon, with its resources and archeology, tells a story of varied activities: the gathering of valuable stone materials from the ancestral river gravel; the building of trails, shelters, terraces and shrines; the daily trek to the river for water supplies; and the artisan at work producing stone tools and petroglyphs for the future.



II.2
An Ecological Stratification of the Southern Pajarito Plateau

DWIGHT L. DRAGER and RICHARD W. LOOSE

INTRODUCTION

In the field of archeology, one area of current concern is investigating the way in which prehistoric and historic populations gained a living from their immediate surroundings. Most archeologists believe that the environmental conditions near a site location strongly influence, if not actually determine, many of the activities which were conducted at that location. One important aspect of the environment, which is being investigated in this regard, is the vegetative context for archeological site locations.

Two techniques for determining vegetative content and structure within the vicinity of site locations are used most frequently: ground-based field survey (such as the one conducted by Tierney, this volume), and interpretations from aerial photographs, the technique employed in this study.

The research design for the Cochiti Project dictated a need to gather vegetative information for an area in excess of 600 square kilometers. To attempt a ground-based vegetative survey for an area of this size would be an undertaking of considerable time and expense beyond the capabilities of the project. For this reason, it was necessary to devise an accurate, yet economical means through which a large area could be stratified into vegetative zones and communities.

Such an economical and accurate technique is the use of aerial photography to define and map vegetative communities for large areas. One or two people, each working a few hours, may accomplish a task which would take weeks to complete in the field. Mapping on-the-ground requires that an extensive surface area be covered such that all portions be seen by the surveyor. This is the only way to be certain that an anomalous feature does not exist in the center of an otherwise homogeneous area; for example, a meadow in the middle of a forest. Unless the meadow were seen by a surveyor, its presence might never be suspected. Aerial photographs show not only the existence of such anomalies, but also their exact size and location. Thus, through an examination of aerial photographs with limited on-the-ground field verification, large areas can be efficiently and accurately stratified into ecological zones.

For this reason, a technique of vegetative stratification, employing aerial photographs, was adopted for this study which resulted in the development of a vegetative map of the southern Pajarito Plateau area. This map could then be used as data descriptive of the kind and distribution of vegetative communities presently characterizing the region.

The general zones, utilized in the stratification, conform to those discussed by Bailey (1913) and Beck and Haase (1969), who based their comments on Merriam (1894). An attempt was made to choose zones which would reflect the location of edible plant resources which were probably exploited by the prehistoric residents of the area.

The following report delineates the procedures employed in developing the aerial stratification and accompanying vegetative map, the limitations and strengths of the stratification, and a comment on the potential vegetative productivity of the southern Pajarito Plateau area for human resource procurement.

TECHNICAL DATA

The photography used for this stratification is on file at the Remote Sensing Division of the Chaco Center of the National Park Service on the University of New Mexico campus. Most of the stratification was done from a single frame of False-Color Infrared film which was flown in August 1973 by the National Aeronautics and Space Administration. It is listed as mission NASA JSC 148, frame 13-0015, and at a scale of about 1: 114000. This frame is approximately 24.68 kilometers on a side and contains about 609 square kilometers. In conjunction with this frame, imagery from the same mission in natural color was used to verify the determinations. This film is NASA JSC 248, roll 12.

Enlargements of two areas along the Rio Grande River in White Rock Canyon and a black-and-white frame 1-2, labelled S.U.G. White Rock, were provided by Koogle and Pouls Engineering of Albuquerque. These were available for reference during the stratification.

The imagery was viewed on a Richard's Light Table using a Bausch and Lomb 7-power magnifier and an 8-power Agfa Lupe. The ecological zones and communities, derived through an evaluation of the imagery, were plotted on a mosaic of U.S. Geological Survey 7.5 minute topographic quadrangles. The maps used were: Bland, N.M.; Frijoles, N.M.; White Rock, N.M.; Canada, N.M.; Cochiti Dam, N.M.; Montoso Peak, N.M.; Santo Domingo Pueblo SW, N.M.; Santo Domingo Pueblo, N.M., and Tetilla Peak, N.M. The completed map is on file at the Office of Contract Archeology, University of New Mexico in Albuquerque.

ECOLOGICAL STRATIFICATION

Procedures

It had been hoped that much of this stratification could be accomplished with the aid of an International Imaging Systems Digicol. This machine has the capabili-

ty of identifying different vegetative zones, as well as recording the simple measurements of the areas encompassed by each zone. Because of the sun angle, much of the imagery available for this stratification was in shade so that consistent densities over the entire image were not maintained. As a result, the Digicol was unable to distinguish the difference between some of the major vegetation in the study area (juniper and pinyon) and thus would not give reliable area measurements. Also, the densitometric capability of the Digicol unfortunately was not operating at the time this stratification was conducted and could not be used.

The present stratification was based, therefore, upon a combination of the following information: 1) results of a visual assessment of color variability reflected on both the Infrared and natural color film; 2) expected vegetative content and structure in the area based upon previous research; 3) knowledge of factors known to condition or affect vegetative content and structure (such as slope, exposure and elevation).

The most difficult discriminations to make were the separation of the lower elevation coniferous trees: pinyon from juniper from ponderosa. Differences in elevation did help, since ponderosa generally occurs at the higher levels. Tree height, which could occasionally be inferred from shadow lengths, also aided in differentiating ponderosa from pinyon. Discriminating juniper from pinyon was much more difficult. Deciduous shrubs, as scrub oak or mountain mahogany, however, produced a very distinct response on the Infrared imagery and could be delineated without difficulty.

Previous research in the southern Pajarito Plateau, an area of high mesas with narrow steep-walled canyons, suggests that the mesa tops are generally pinyon covered; the north-facing canyon walls hold much scrub oak; and the south-facing canyon walls have little, if any, vegetation and then usually only cacti.

With expectations of this kind, it was not difficult to look at known areas on the film to discover the response a certain type of vegetation would give. One area of aspen, for example, was identified because it resembled a known area of aspen in the Sandia Mountains which had also been photographed on the same roll of film.

Exact zone boundaries were occasionally drawn by following topographic lines on the USGS quadrangles. In such cases as a mesa top pinyon zone bordered by a north-facing scrub oak canyon zone, this is a reasonable approach. In other cases, topographic lines indicate the location of major features and can be used to identify zone changes; for instance, a north-facing slope which meets a south-facing slope at the crest of a ridge.

The procedure for transferring the data in the photography to the map mosaic was to note major topographic features such as the river or its side canyons on the film, identify their associated vegetation and mark the maps accordingly. When the edge of a zone was encountered, the plant types of the next zone were then identified and mapped, and so on, away from major features. In this way, the entire area was covered.

Initial Results

The southern Pajarito Plateau lies in the Upper Sonoran Ecological Zone with the higher elevations changing to Transition Zone and then to Canadian Zone (Bailey 1913). In addition to identifying these three major zones during the aerial stratification, twelve native plant communities and two types of modern agricultural fields were delimited. These are as follows: Canyon Riparian (cottonwood, salt cedar, willow); Upper Sonoran Arid (yucca, prickly pear, cholla); Upper Sonoran Deciduous (scrub oak); Upper Sonoran Deciduous and Coniferous (scrub oak and pinyon); Upper Sonoran Coniferous (pinyon; pinyon and juniper; juniper); Upper Sonoran Juniper Grassland (juniper and mixed grasses); Transition Forest (ponderosa); Transition Mountain Meadow (mixed grasses); Canadian Deciduous (aspen); Canadian Coniferous (Douglas fir); agricultural fields and orchards.

Adjustments

After completing the initial ecological stratification of the southern Pajarito Plateau, it was discovered that a map of the Principal Vegetative Types of Bandelier National Monument, a smaller area entirely within the boundaries considered by this study, had already been produced. This map was made through the use of both ground survey and aerial photography for the National Park Service and was drawn at the same scale as the USGS topographic maps used for this study. This was extremely convenient, since the two maps could be checked against each other simply by overlaying one upon the other on a light table. With only a few exceptions, the zones on the two maps coincided.

The single largest difference was caused by a weather characteristic of the study area. In August, the date on which the imagery used was flown, the temperatures are so high and the rainfall so low that most of the trees at the lower elevations stop evapo-transpiration and, hence, stop the production of chlorophyll. Since the imagery which was used was near-infrared sensitive, the trees at lower elevations registered as black images. Personal familiarity with the area indicated that the trees at the lowest elevations were generally species of juniper. Therefore the assumption was made that juniper "shut down" in August and could be discriminated from pinyon, since pinyon still was giving a red response on the film at areas of higher elevation. The Bandelier map showed this assumption to be erroneous. Evapo-transpiration "shut down" does occur at lower dessicated areas, but for both pinyon and juniper. At higher elevations which continue to receive summer rainfall, both pinyon and juniper continue to evapotranspire, produce chlorophyll and reflect Infrared. Black images, as opposed to red images, were not considered as a valid criterion for the discrimination of pinyon from juniper. The map zones were changed to agree with the Bandelier map and these changes are reflected in Fig. II.2.1.

Weather conditions caused also another discrepancy between the two maps. The Bandelier ground survey discovered that a phenomenon, which had been recorded in other areas of the Southwest, was occurring also on the Pajarito Plateau. The Wetherill Mesa Project in Mesa Verde National Park (Erdman *et. al.* 1969) discovered that in the deep canyons of the Mesa Verde, cold air would be trapped at night. This "cold sink" had the effect of creating a "colder" ecological zone in the canyon bottoms. In the Pajarito area, therefore, those canyon bottoms at lower elevations hold pinyon and juniper while the mesa tops have juniper grasslands. At higher

II.2 ECOLOGICAL STRATIFICATION OF THE SOUTHERN PAJARITO PLATEAU

TABLE II.2.1

CONTENT OF AERIAL COMMUNITIES AND ZONES

AERIAL COMMUNITY	SPECIES	COMMON NAME
Canyon Riparian	*Populus fremontii* *Populus Angustifolia* *Salix lasiolepis* *Tamarix* sp. *Typha latifolia*	Fremont cottonwood Narrow-leaf cottonwood Arroyo willow Salt cedar Cat-tail
Upper Sonoran Arid	*Yucca bacchata* *Yucca glauca* *Opuntia* spp. *Opuntia* spp.	Yucca Yucca Prickly pear Cholla
Upper Sonoran Deciduous	*Quercus gambeiii* *Cercocarpus* sp.	Gambels oak Mountain mahogany
Upper Sonoran Deciduous	Mixture of Upper Sonoran Deciduous and Upper Sonoran Coniferous	
Upper Sonoran Coniferous		Pinyon
Upper Sonoran Coniferous	*Pinus edulis* *Juniperus* spp.	Pinyon Juniper
Upper Sonoran Juniper	*Juniperus scopulorum* *Juniperus monosperma* *Juniperus deppeana*	Rocky Mountain juniper One-seeded juniper Alligator-bark juniper
Upper Sonoran Juniper-Grassland	*Juniperus* spp. various grasses	Juniper
Transition Forest	*Pinus ponderosa*	Ponderosa pine
Transition Mountain Meadow	*Pinus ponderosa*	Ponderosa pine
Canadian Deciduous	*Populus tremuloides*	Quaking aspen
Canadian Coniferous	*Pseudotsuga menziesii*	Douglas fir
Agricultural Fields	cultivated wheat and corn	
Orchard	commercial apple orchards	

elevations, ponderosa are found in the canyon bottoms with pinyon and juniper on the mesa tops. The Bandelier map showed these zone inversions, and our base map was corrected.

Two additional slight discrepancies exist between the two maps. First, the Bandelier map indicates sheer rock faces along many of the canyon walls. Our map indicates most of these areas as Upper Sonoran Arid which contains yucca, prickly pear and other desert-dwelling plants. Since most of these plants do occur in these areas, although in low frequency, the category of Upper Sonoran Arid was retained which gives some indication of potential vegetative resources available in the zone.

The second slight discrepancy which the Bandelier map shows, occurs at the highest elevations considered on the maps. In these areas, some spruce (*Picea* spp.) and fir (*Abies* spp.) occur in the zone we have marked Transitional Forest. This has not been indicated on our map, since the areas are small and distant from known archeological site clusterings. Any sites which exist in these areas would, most likely, be used for the same purposes as sites which are found in pure Transition Forests which are far from an Upper Sonoran-Transition Zone ecotone and which contribute little to the available exploitable resources. The primary reason for not delineating these areas was that the film did not show a significant difference in the Infrared response between ponderosa and spruce or fir. This, of course, was not true of Douglas fir or aspen, and those areas were delineated on our map.

The availability of the Bandelier ground-based map was extremely useful in evaluating the accuracy of a map generated solely from aerial photography. Unfortunately, it covered only a small portion of the entire

study area which left a large area yet to be ground-checked. The discrepancies, found between the two maps, indicated some of the weaknesses of aerial-based ecological studies; however, they also have shown its strengths. That the two maps agreed, as closely as they did, may well justify the aerial mapping technique. Corrections and readjustments in the aerial map then can be made from only a few, short well-planned ground checking sessions instead of expensive long-term ground studies.

Field Check

A field check of the final map, however, was still required in order to test its accuracy in areas not already checked against the Bandelier map. Several areas, reflecting different vegetative zones and different physiographic situations, were selected for field verification: 1) the Peralta Canyon area; 2) the mesas just to the north of Frijoles Canyon, and 3) an area on the east side of the Rio Grande River in the vicinity of New Mexico State Road 4. This field check was conducted by one of the authors on March 21, 1976.

The entire length of Peralta Canyon, within the bounds of the study area, was examined. It was found that the problem caused by the "shutting down" of chlorophyll generation at lower elevations, as previously discussed, also caused the incorrect assignment of ecological zones in this area. After leaving the modern village of Cochiti, which lies at the mouth of Peralta Canyon, and traveling up Peralta Canyon to the west, pinyon first are encountered 1.93 kilometers from the turn-off. At this point, the pinyon drop down, off the nearby mesas, and into the canyon bottoms. An apparent "cold air trap" is strong enough to allow pinyon to live here. Below this point in the canyon, juniper is the only tree; however, pinyon does grow on the surrounding mesa tops. From a point in the canyon 2.57 kilometers above Cochiti, the vegetation is mixed pinyon and juniper along the entire western edge of the study area. This area was originally indicated as Upper Sonoran-Juniper.

The north rim of Frijoles Canyon is ponderosa forest. Pinyon and juniper then are encountered at a point 6.44 kilometers below the upper turn-off to Los Alamos on State Road 4 above the entrance to Bandelier National Monument. The campground inside Bandelier on the north rim of Frijoles Canyon, though called Juniper Campground, is located in highly predominant pinyon vegetation with only scattered juniper present.

The east side of the Rio Grande River, as seen from State Road 4, is a mixed pinyon-juniper community. Though slightly north of the study area, conversations with the Cochiti archeological survey crew who worked in this area indicate that pinyon and juniper are also mixed within the bounds of the mapped area.

The survey crew also indicated that pinyon could be found further south on the east side of the river. This would suggest that the area which was marked as juniper without pinyon also was incorrectly assigned on this side of the river.

Vegetative Map

The vegetative map, reproduced in Fig. II.2.1, reflects the distribution of modern ecological proveniences, both life zones and vegetative communities, in the southern Pajarito Plateau which were defined through the aerial stratification. This map incorporated the adjustments discussed for the Bandelier area, as well as some of the observations made during the field check. Table II.2.2 quantifies the distributions of these zones by drainage basin for the study area.

TABLE II.2.2

SUMMARY OF ECOLOGICAL COMMUNITIES BY DRAINAGE BASIN
(all measurements in square kilometers and per cent of total)

	UPPER SONORAN								TRANSITION	CANADIAN			
Basin Name or Number	Riparian	Cholla, Yucca, Prickly Pear	Scruboak	Scruboak Pinyon	Pinyon	Pinyon-Juniper	Juniper	Juniper-Grassland	Ponderosa	Aspen	Douglas Fir	Other	Total
Alamo	0.5 (2.6)	2.8 (15.7)	0.6 (3.4)		0.1 (0.3)	1.4 (7.8)	1.0 (5.8)	2.2 (12.6)	9.2 (51.8)				17.8
Ancho	0.8 (4.6)	1.7 (9.5)	1.1 (6.1)		6.1 (33.4)		0.3 (1.9)	0.2 (0.9)	7.9 (43.6)				18.1
Arroyo Montoso		2.1 (8.5)					21.1 (83.9)	1.9 (7.6)					25.1
Bland	0.1 (0.2)	1.3 (2.3)	0.1 (0.1)	2.2 (4.1)	2.8 (5.2)		27.7 (51.8)	0.3 (0.5)	19.1 (35.8)				53.6
Canada de Cochiti (Tetilla)		3.2 (9.1)					14.1 (39.5)	18.4 (51.4)					35.7

TABLE II.2.2 (cont.)

	UPPER SONORAN								TRANSITION	CANADIAN			
Basin Name or Number	Riparian	Cholla, Yucca, Prickly Pear	Scruboak	Scruboak-Pinyon	Pinyon	Pinyon-Juniper	Juniper	Juniper-Grassland	Ponderosa	Aspen	Douglas Fir	Other	Total
Canada del Buey					5.4 (60.7)		0.2 (1.9)		2.4 (27.2)			0.9 (10.2)	8.9
Capulin	1.8 (3.7)	2.1 (4.4)	0.4 (0.9)			9.9 (20.4)	8.8 (18.3)	7.1 (14.7)	17.4 (36.1)	0.1 (0.2)	0.6 (1.3)		48.2
Cedro					2.4 (85.0)				0.4 (15.0)				2.8
Chaquehui	0.3 (6.4)	0.7 (15.0)	0.3 (7.3)		2.9 (67.6)				0.2 (3.7)				4.4
Los Alamos					4.6 (31.7)		4.7 (32.0)	4.3 (29.6)	1.0 (6.7)				14.6
Lummis	0.3 (1.7)	2.9 (16.6)			1.9 (10.8)	3.9 (22.1)	1.8 (10.1)	1.6 (9.0)	5.3 (29.7)				17.7
Medio		0.8 (5.2)	0.8 (5.2)		0.9 (5.4)	4.9 (30.4)	8.2 (51.2)	0.2 (1.1)	0.1 (0.8)	0.01 (0.1)	0.1 (0.6)		16.0
Mortendad		0.2 (1.4)			7.0 (52.2)		0.5 (3.5)	1.3 (9.6)	4.4 (33.3)				13.4
Pajarito		0.2 (0.9)			6.5 (27.2)		0.3 (1.3)	0.4 (1.7)	15.4 (64.8)			1.0 (4.1)	23.8
Peralta	1.7 (2.9)	2.8 (4.8)	0.7 (1.1)		10.4 (17.6)		40.4 (68.4)	0.8 (1.4)	2.2 (3.8)				59.0
Potrillo								1.5 (32.6)	2.6 (54.9)			0.6 (12.5)	4.7
Rio Chiquito above junction with Bland	1.1 (3.1)	3.7 (10.4)	0.3 (0.7)	5.4 (15.3)	1.1 (3.0)		19.3 (54.9)		2.7 (7.8)			1.7 (4.8)	35.3
Rio Grande below White Rock Canyon	4.7 (28.6)											11.7 (71.4)	16.4
Rio Grande in White Rock Canyon	0.1 (0.2)	10.8 (18.1)	0.7 (1.1)		2.6 (4.4)	0.8 (1.4)	29.2 (49.0)	15.0 (25.2)				0.4 (0.6)	59.6
Rito de Frijoles	0.8 (2.7)	1.7 (5.9)	0.9 (3.1)		1.9 (6.7)	0.2 (0.8)		0.3 (1.0)	22.5 (79.8)				28.3
Sanchez	0.4 (2.0)	0.5 (2.7)	0.4 (2.0)	0.9 (4.7)		1.8 (9.2)	4.9 (25.3)		10.4 (53.4)	0.1 (0.6)			19.4
Sandia					8.4 (54.1)		1.9 (12.5)	1.3 (8.6)	3.9 (24.8)				15.5
Santa Cruz		1.4 (17.6)					4.5 (55.1)	2.2 (27.3)					8.1
Santa Fe		3.3 (7.4)					2.7 (5.9)	39.1 (86.7)					45.1
Seguro-La Jara							47.7 (83.3)	9.6 (16.7)					57.3
Three Mile					0.2 (4.0)				3.4 (75.0)			0.9 (21.0)	4.5
Water	1.4 (4.6)	0.5 (1.65)	0.5 (1.65)		7.2 (23.8)		1.9 (6.2)	0.3 (0.9)	14.7 (48.4)			3.9 (12.8)	30.4

TABLE II.2.2 (cont.)

		UPPER SONORAN							TRANSITION	CANADIAN			
Basin Name or Number	Riparian	Cholla, Yucca, Prickly Pear	Scruboak	Scruboak-Pinyon	Pinyon	Pinyon-Juniper	Juniper	Juniper-Grassland	Ponderosa	Aspen	Douglas Fir	Other	Total
Basin Number 1		0.03 (0.4)					7.1 (81.2)	1.6 (18.4)					8.7
2							0.6 (39.7)	1.0 (60.3)					1.6
3							2.0 (75.4)	0.6 (24.6)					2.6
4							1.8 (88.4)	0.2 (11.6)					2.0
5							0.6 (93.8)	0.1 (6.2)					0.7
6							0.9 (60.1)	0.6 (39.9)					1.5
7							3.1 (79.0)	0.8 (21.0)					3.9
8	0.1 (5.2)						2.2 (88.5)	0.2 (6.3)					2.5
9		0.6 (6.1)					6.5 (68.1)	2.5 (25.8)					9.6
10		0.1 (4.8)					1.8 (85.7)	0.2 (9.5)					2.1
11		0.1 (10.8)					0.6 (76.2)	0.1 (13.0)					0.8
12		1.2 (45.1)					1.1 (42.4)	0.3 (12.5)					2.6
13							2.8 (80.8)	0.7 (19.2)					3.5
14		0.04 (0.7)					4.6 (72.4)	1.7 (26.9)					6.3
15		0.1 (5.1)					0.3 (21.0)	1.1 (73.9)					1.5
16							2.6 (100.0)						2.6
17							1.8 (100.0)						1.8
18							2.0 (100.0)						2.0
19							1.9 (100.0)						1.9
20							3.2 (100.0)						3.2
21							1.7 (100.0)						1.7
22							1.3 (96.6)	0.05 (3.4)					1.4

TABLE II.2.2 (cont.)

		UPPER SONORAN							TRANSITION	CANADIAN			
Basin Name or Number	Riparian	Cholla, Yucca, Prickly Pear	Scruboak	Scruboak-Pinyon	Pinyon	Pinyon-Juniper	Juniper	Juniper-Grassland	Ponderosa	Aspen	Douglas Fir	Other	Total
Basin Number 23							1.0 (96.3)	0.04 (3.7)					1.04
24							3.1 (68.3)	1.4 (31.7)					4.5
Total	14.1 (1.9)	44.8 (6.0)	6.8 (0.9)	8.5 (1.1)	72.4 (9.6)	22.9 (3.1)	295.8 (38.9)	121.2 (16.2)	145.2 (19.4)	0.2 (0.03)	0.7 (0.1)	21.1 (2.8)	753.7

Both the field check and the Bandelier work isolated one major problem area in the aerial stratification: an inability of the film to distinguish different Upper Sonoran Coniferous communities (pinyon from pinyon-juniper from juniper). Consequently, a residual category of Upper Sonoran Coniferous (undifferentiated pinyon and/or juniper) was developed. For those areas which were field checked, the pinyon, pinyon-juniper and juniper communities are distinguished on the vegetative map. For those areas which were not field checked, this residual category was employed. In general, however, pure juniper communities are found in the lower elevations, followed by mixed pinyon-juniper and pure pinyon communities.

A COMMENT ON THE PRODUCTIVITY OF ECOLOGICAL ZONES

The stratification of an area into vegetative communities is only the first step in an evaluation of the biotic resource potential of that area. In fact, one anticipates variability in the distribution and number of usable or economically productive resources which occur within a region. A study of the location of edible native plants, which were known to have been used as food resources by prehistoric and historic residents of New Mexico, has been conducted by one of the authors (Drager n.d.). The results of this study provide some information concerning differences in the productivity of ecological zones in New Mexico; the data are summarized below.

This study partly was based upon information derived from Castetter (1935); Elmore (1944); Harrington (1915); Martin *et al.* (1952); Robbins *et al.* (1916); Standley (1911); Stevenson (1915); and White (1944). A total of 47 types of native edible plants were examined for their distribution in New Mexico. Using the life zone categories established by Merriam (1894) as applied to New Mexico by Bailey (1913) it was found that certain ecological zones could be expected to yield greater numbers of edible plant resources than other zones. Tables II.2.3-5 summarize, by zone, the distribution of the monitored plants.

TABLE II.2.3

SPECIES OCCURRENCE BY LIFE ZONE

Edible Plants	Lower Sonoran	Upper Sonoran	Transition	Canadian	Hudsonian
Agave spp.	x	x			
Allium spp.	x	x	x	x	
Amaranthus retroflexus	x	x	x		
Amelanchier spp.		x	x		
Asclepias spp.		x	x		
Astragalus spp.	x	x	x		
Atriplex spp.	x	x			
Berberis spp.	x	x	x		
Calochortus Nuttallii		x	x	x	
Ceanothus Fendleri			x		
Celtis reticulata		x			
Chenopodium spp.		x	x		
Cleome serrulata	x	x			
Cymopterus Fendleri		x	x		

TABLE II.2.3 (cont.)

Edible Plants	Lower Sonoran	Upper Sonoran	Transition	Canadian	Hudsonian
Cyperus inflexus		x	x		
Dasylirion Wheeleri	x				
Echinocereus spp.	x	x			
Ephedra spp.	x	x			
Fragaria spp.		x	x	x	x
Frasera speciosa			x		
Helianthus annuus	x	x	x		
Juglans major		x			
Juniperus spp.		x			
Liatris punctata	x	x			
Lycium pallidum		x			
Mammillaria spp.	x	x			
Oenothera spp.		x	x		
Opuntia spp.	x	x			
Physalis spp.		x	x		
Pinus edulis		x			
Portulaca oleracea	x	x	x		
Prosopis spp.	x				
Prunus americana			x		
Prunus melanocarpa			x		
Quercus spp.	x	x	x		
Rhus trilobata		x	x		
Ribes spp.		x	x	x	x
Rosa spp.			x		
Rubus parviflorus			x		
Rubus arizonensis			x		
Rudbeckia laciniata		x	x		
Rumex spp.	x				
Sambucus spp.	x		x	x	
Smilacina amplexicaulis			x	x	
Typha latifolia	x	x	x		
Vitis arizonica		x	x		
Yucca spp.		x			

TABLE II.2.4

NUMBER OF EDIBLE SPECIES PER LIFE ZONE

Life Zone	Number of Edibles	Ecotone	Number of Edibles
Lower Sonoran	20	Lower Sonoran-Upper Sonoran	39
Upper Sonoran	35	Upper Sonoran-Transition	44
Transition	30	Transition-Canadian	30
Canadian	7	Canadian-Hudsonian	7
Hudsonian	3	Hudsonian-Alpine	3

Acknowledgement must be made to the Remote Sensing Project of the Chaco Center, National Park Service, for the use of their equipment and space to accomplish this work.

II.3
A Vegetative Survey of White Rock Canyon: 5280–5400 Foot (1610–1646 Meter) Elevations

GAIL D. TIERNEY with field assistance by LISA A. JONES

INTRODUCTION

The material presented in this report is the result of a vegetative survey of certain portions of White Rock Canyon which lie between 5280 and 5400 ft (1610-1646 m) elevation. It extends along the Rio Grande trough from approximately 35 degrees 39 minutes 0 seconds to 35 degrees 41 minutes 12 seconds north latitude. The term of the survey was from April 3, 1975 to late May, 1975; twelve days of this period were devoted to useful field work.

The immediate objectives of the survey were to observe, record and retrieve physical evidence of the vegetation types and patterns which prevail within the stated elevation regimes; specifically, those regimes soon to be submerged by the filling of Cochiti Lake. The long term ecological and botanical study objectives were to provide information concerning the general environmental context for human adaptation within the White Rock Canyon area.

The present study was necessarily limited to a narrow range of elevations at the bottom of the canyon and the material presented is botanically descriptive rather than analytical in character.

A previous study, conducted by Dan Witter (1975), characterizes the vegetative zones and plant associations to be found within the wider environs of the canyon. The earlier study was based upon field observations which were made during a short survey in January, 1975, and provides much of the terminology and framework for the present report. Witter's terminology was used consistently for organizing and structuring our observations, though there are instances where his characterizations are altered (one must remember that Witter's survey was conducted in mid-winter). Such instances of disagreement are cited, as they arise, in the relevant material following Witter's prefatory section.

GEOGRAPHICAL OVERVIEW

Life Zones

The location of the study area, and the approximate sites of selected areas for the vegetation survey, are shown on Fig. II.3.1. The study area lies entirely within the Upper Sonoran Zone. In the environs of White Rock Canyon, this zone may be traced upwards, out of the elevation range of interest, to altitudes above 7000 ft (2134 m) (Robertson 1968).

Visually dominant and representative vegetation of the Upper Sonoran 5300-5400 ft (1616-1646 m) levels in White Rock Canyon includes: one-seeded juniper; grama grass; snakeweed; several species of *Chrysothamnus* (rabbitbrush, or locally "chamisa"); Apache plume: several species of *Artemisia*, and *Yucca*, but few pinyon pines. Plants, found on the banks of the river and on the beds and margins of the intermittent streams joining the main canyon, are generally atypical of the Upper Sonoran Zone They are the consequence of the highly equibility and more mesic conditions which prevail in the canyon troughs.

Climate

The climate in White Rock Canyon has not been studied. The available data apply to the macroclimate of the surrounding region, and even that must be inferred from averages of the pertinent quantities which are measured at widely spaced stations. The following information is, therefore, presented only as a guide for establishing regional climatic parameters. The quantitative material is taken from contour maps in Tuan *et al* (1969).

1. Precipitation

The regime of White Rock Canyon is arid to semi-arid. The average annual precipitation is approximately 10.2 inches (264 mm). Of this amount, 1.7 inches (144 m) are deposited in winter (December-February); 1.5 inches (39 mm) in spring (March-May); 5.0 inches (129 mm) in summer (June-August); and 2.0 inches (52 mm) in fall (September-November).

The spring precipitation figure may give a false impression of the moisture available within White Rock Canyon during that season. The west side of the canyon is cut by many tributary and drainage channels which originate on snow-bearing elevations lying to the northwest on the Pajarito Plateau. Also, the spring flood season of the Rio Grande generally begins in April or May (see Brakenridge, this volume).

2. Temperature

The averaged daily temperature in the vicinity of White Rock Canyon is approximately 32 °F in January and 70° F in July. The quoted annual minimum and maximum temperatures are respectively -12°F and 98° F. The diurnal temperature variation on the open rim of the canyon may exceed 40°F in spring and slightly less in fall. However, the amplitudes of the seasonal and diurnal variations in temperature are probably smaller within the canyon than the values just quoted, due to the reflection of thermal radiation and heat trapping by the canyon walls. These thermal effects compete with the convective cooling of the diurnal canyon winds, cool downvalley winds at night and warm upvalley winds in the daytime. The net effect, however, is unknown.

The spatial variations in temperature, within the canyon at any given time of day or season, are likely to be very significant for the vegetative growth to be observed. Such spatial variations could show up on the seasonal level as a difference of as much as three weeks during the onset of the growing season for two locations directly opposed on the river; or on a diurnal basis, as temperature differences of as much as 8° F between south facing and north facing sides of the canyon. For further information, refer to the data for Frijoles Canyon in Tuan *et al* (1969).

The canyon surroundings experience about 168 frost-free days; that is, days in which the temperature always exceeds 32° F. This period is, of course, longer than the proper term for the growing season which requires daytime minimum temperatures in excess of 40° F. The term of the growing season, within White Rock Canyon, is probably highly location-specific. The last frost in spring for the region occurs not later than May 5, and the first frost in the fall is not earlier than October 20.

3. Exposure and Insolation

White Rock Canyon lies in that part of New Mexico which receives approximately 75% of the annual possible sunshine. However, within the canyon trough and especially on the river bed, the horizons may be obscured by canyon walls up to and including angles of 70°. This shadowing effect may diminish the daily amount of direct solar radiation received by a given vegetation plot. Similarly, the sky solid angle which determines the amount of diffuse radiation received by a plot may be reduced to 30% of its flat-plan value. All intermediate exposures seem possible, and this wide variation probably accounts for much of the heterogeneity observed within the vegetation patterns.

PREVIOUS WORK IN THE AREA

With the exception of a brief botanical study conducted by Witter (1975), there appears to be a lack of published works on the ecology, botany or climate of that portion of White Rock Canyon covered by our survey. A comprehensive search of the literature was *not* made; however, the brief review of the literature did consider local sources such as MS and PhD theses as well as State Agency reports. Some works on relevant topics or neighboring geographical areas are reviewed below.

Among the earlier related work at White Rock Canyon, is an analysis of the floral remains recovered from pithouses excavated during the 1963 field season of the Cochiti Dam Archeological Salvage Project (Ford 1968). Apart from the cultigens (mostly corn) found within several pithouses, Ford and his colleagues analyzed and were able to identify several fragments of wild plants found in association with the ruins. None of the plant species, so identified, are unusual in any way. They all grow contemporaneously and are common in the proper season within the canyon, or on the open flats and woodlands near the mouth of the canyon, about three kilometers south of the present area of interest.

Other related and informative works are incorporated within those theses by Robertson (1968) and Koehler (1974). Robertson compared the flora of Cochiti and Bland Canyons above the 6000 ft (1829 m) level which, unfortunately, is well above the elevation range of interest. Many of his conclusions regarding the causes of different vegetative patterns observed in narrow canyons should, nevertheless, apply to extensions of the tributary canyons below 6000 ft (1829 m). As demonstrated by his data, differential exposures and mesicness in the canyon troughs often combine to invert the "normal" ordering of plant communities with increasing elevation above mean sea level. Robertson also gives a check list of plant species recorded in the Cochiti-Bland Canyon area (some 67 families and 367 species) which should be invaluable for future resource studies relevant to the area. Slightly less than one third of the recorded species in his check list were observed in the present study.

Koehler's work (1974) concentrated on the ecological impact of feral burros on Bandelier National Monument lands. It is mentioned here because it tends to confirm indirectly our present observation, that much of the range within the study area is severely disburbed. Koehler's map of vegetation shows poor to very poor, deteriorating conditions for the pinyon-juniper and juniper communities located along the southeastern boundaries of the Bandelier National Monument. Although the present study area lies to the south and east of the Monument boundary, Koehler's assessment can be maintained although the major causes of disturbance are different.

Content and Structure of Vegetative Zones in the White Rock Canyon Area

In mid-January, 1975, a brief botanical survey of portions of White Rock Canyon and its immediate environs was conducted by Dan C. Witter. During this survey, one half day was spend in a general reconnaissance of the area and two days were spent recording vegetative information for nine transects located in lower White Rock Canyon (see Witter 1975). Based on the theoretical principle of dominance and augmented by information collected during this survey, three taxonomic levels of vegetative structure (ecosystem, biotic community and plant association) were proposed for the general White Rock Canyon-Pajarito Plateau area. Also, botanical content for each level was suggested. These are summarized in Tables II.3.1-3, and have been reproduced from Witter (1975) and from Witter's field notes (Witter n.d.) which are on file at the Office of Contract Archeology, University of New Mexico. Definitions pertinent to these summaries are included below.

1. DOMINANCE

The basic concept [of dominance] centers on the degree to which one species is able to influence both its own environment and the environment of other species. It is a measure of the ecological importance or significance of a species in relation to other organisms associated with it. The idea of dominance may also be extended to life forms or structural properties of groups of species. Dominance is a systemic property and is not measured directly by indices or other estimators such as percentage of ground cover, biomass, stratification of canopies, etc. (Witter 1975:32).

2. ECOSYSTEM

Ecosystem is primarily defined as a unit of energy flow which implies an aggregation of organisms self-organized on the basis of energetic relationships. It is usually assumed to be a consistent unit structurally (forest, grassland, etc.) with a common microclimate (Witter 1975:32).

3. **BIOTIC COMMUNITY**

> *Biotic community* is used...as the variability of polythetic patterns of dominant plants and associated animals and plants within the general area. Biotic communities were defined on the basis of patterning of dominant plants and regularities of associated plants. It is used here as a higher taxonomic category than plant association (Witter 1975:32).

4. **PLANT ASSOCIATION**

> [Plant associations represent] a monothetic variability within a biotic community. The assumption underlying a biotic community is that multiple determining factors are interacting to produce a characteristic assemblage of organisms. However, within such an environment, it is usual for one determining factor (usually the one most independent) to vary while the others remain somewhat constant. This variability tends to produce significant changes in the vegetational structure, relative species composition, and the relative density. It is this variation which is here classified into plant associations (Witter n.d.).

5. **ABUNDANCE**

> ...dominant (D) (see above for definition); common (C), or generally distributed, forming about one half or one third of the ground cover; locally common (LC), same as common except that stands occur in clumps rather than being evenly distributed. few (F), less than one half or one third of the ground cover; locally few (LF), sparse clumps instead of a general scatter; rare (R), only occur occasionally, insignificant ecologically (Witter 1975:31).

Witter proposed four ecosystems: 1) Jemez Mountain Slope Ecosystem; 2) Jemez Piedmont Ecosystem; 3) Rio Grande Valley Ecosystem; and 4) White Rock Canyon Ecosystem. A general description of each ecosystem and a brief discussion of some of the parameters conditioning each ecosystem are summarized in Tables II.3.1. Table II.3.2 suggests the species complement for each of the biotic communities proposed for the area with their relative abundance, and shows which communities correspond to the aerial communities proposed by Drager and Loose, this volume. Table II.3.3 suggests the structure and content of the plant associations proposed for the present study area.

FIELD METHODS

The Selection of Vegetation Survey Sites

After a brief walking reconnaissance of the study area and recognizing the time limitations for field work, it was decided that efforts should be concentrated upon the intensive study of each of a series of typical and accessible stands of vegetation within the elevation regime which were threatened by the filling of Cochiti Lake. The announced fill rate of the lake dictated the order in which survey at different elevations was conducted. Selected river-side communities at elevations 5280 plus or minus 3 ft (1610 m plus or minus 1.0m) were studied first.

The remaining criteria for the selection of a particular area of intensive observation were: apparent differences between the site's vegetation and the plant communities seen in previously surveyed sites; the accessibility of the site in question; and finally, certain information provided by the OCA field staff. Local weather and time limitations also determined the choice of study areas.

Survey Procedures

Essentially the same procedure was followed at each of the vegetative survey areas which were selected for study.

Site location was first determined and recorded on an aerial photomap. Rough triangulation on prominent terrain features located the center of the area within an error circle of a 100 m radius. The approximate latitude/longitude and elevations were later determined by comparing the positions marked on the aerial photomap with a 7.5 minute series, USGS topographical map (Cochiti Dam, N.M., N3537.5-W20615/7.5, 1953). The error in quoted elevations thus will be plus or minus 10 feet.

We then walked through the vegetation stands surrounding the center of the site, and recorded the types and degree of abundance of the observed plant species. A second walk was then made, over approximately the same route as the first pathway, for the purpose of collecting and pressing specimens of plants which were rare, or common, but unidentifiable in the field. Depending upon the natural area and terrain type of the chosen survey area, these walks ranged from one-half acre to five acres (1 acre = 4046 m^2). All botanical specimens were pressed in standard plant presses, and stored for later use.

When transect and quadrat counting was feasible and appropriate, we marked off an area and proceeded to count plants in successive 3.5 x 3.5 m sectors. Counts were only made of those species which were not rare and were field-identifiable, or deemed capable of receiving positive identification in the laboratory. (Note: there is some ambiguity in the operational definition of "counting" plants. The method of counting, which was used, is explained below in the Key to Plant Lists and Transects.) The transect locations and directions were always chosen with the intent of cutting through a *representative* cross-section of the plant communities, rather than trying to include certain singular or atypical features. However, descriptions of anomalous vegetation were recorded in the field notes.

When time permitted, sample measurements were taken of typical dimensions of the dominant vegetation in the transects. Certain areas were resurveyed on foot a third time to verify, amend, or supplement our initial impression.

DATA FROM SELECTED VEGETATIVE SITES

The data from ten selected vegetative sites are presented in the following sections. Each site is located and given a summary description; a plant species list is also attached. Transect frequency plots and comments for certain sites are also included.

Key to the Plant Lists and Transect Plots

Each entry in the lists of observed plant species lists a notation including the rough degree of abundance, the common name of the plant, the plant genus, and, if known, the plant species. For example:

D-LF One-seeded juniper *Juniperus monosperma* Jumo

TABLE II.3.1

ECOSYSTEMS FOR THE PAJARITO PLATEAU - COCHITI AREA

JEMEZ MOUNTAIN SLOPE ECOSYSTEM
(Transition Life Zone)

1. increased precipitation (Jemez climatic system)
2. cooler temperatures
3. generally greater equibility
4. altitudinal zones on the south, east and lower slopes
   a. minimum-mesic
   b. maximum-xeric
5. biotic communities
   a. Ponderosa Montane
      steeper slopes
   b. Montane Meadow
      flat slopes
   c. Douglas Fir
      higher elevations (Canadian Life Zone)

JEMEZ PIEDMONT ECOSYSTEM
(Upper Sonoran Life Zone with ecotonal effects with Transition Life Zone)

1. intermediate precipitation
2. intermediate temperatures
3. intermediate equibility
   a. minimum-mesic
   b. maximum-xeric
4. biotic communities:
   a. Pinyon-Juniper
      ponderosa climate, but xeric effects from southwest exposure and steep slopes
   b. Side Canyon Riparian
      mesic effects in canyon and equibility, running water results in riparian species
   c. Mesa Juniper-Grama
      xeric, low equibility because of general exposure
   d. Mesa Draw
      greater shelter from winds and sun, especially on the south and west sides and bottoms, with increased mesic, equible conditions

RIO GRANDE VALLEY ECOSYSTEM
(Upper Sonoran-Riparian Zones)

1. decreased precipitation
2. increased temperatures
3. less equibility
4. biotic communities
   a. Open Valley
      not as xeric, mainly on the west sloped or alluvial soils retaining moisture
   b. Juniper Grassland
      mainly on dry, exposed mesas with gravelly or stony soils
   c. Bosque
      mesic because of proximity with a braided river and less shallow water table; poor equibility macroclimate but high equibility microclimatically beneath the canopy
   d. Flood Plain
      flat, clayey soils, periodic flooding in past now under irrigated conditions

WHITE ROCK CANYON ECOSYSTEM
(Upper Sonoran-Riparian with Transition Elements)

1. gradient from intermediate precipitation/temperature to the cooler and more moist effects produced by the proximity to the Jemez Mountains
2. increased equibility resulting from reduced wind effects, solar warming and higher humidity
3. canyon width-depth ratio
4. biotic communities:
   a. Riparian-Juniper
      more xeric, important subdominant species change depending on proximity to Jemez Mountains; exposure by height, width, and angle to north of canyon walls, slope, and closeness to canyon rim or bottom
   b. Mountain Mahogany
      maximally mesic; located relatively close to Jemez Mountains; effects from seeps from the consolidated conglomerate sides
   c. Deciduous Riparian
      xeric conditions of exposure with increased photosynthesis period; away from Jemez Mountains but located on an alluvial bank near the river thus increasing mesic effects
   d. Stream Side
      narrow channel caused by regular flooding, otherwise poor equibility, but very wet

TABLE II.3.2

BIOTIC COMMUNITIES FOR THE PAJARITO PLATEAU - COCHITI AREA

COMMUNITY	SPECIES	ABUNDANCE	AERIAL ZONE
Ponderosa Montane	Ponderosa	Dom-C	Ponderosa
	Holly Leak Oak	LF	
	Mountain Mahogany	LF	
	Juniper	LF	
	cf. Echinocereus	R	
	Small Rabbibrush	R	
	Prickly Pear	R	
	cf. Mountain Poa	LC	
	Grama Grass	LC	
	Side Oats Grama	LF	
	?Nolina	R	
	Apache Plume	R	
	Cholla	R	
	Large Rabbitbrush	LF	
	Pinyon	LF	
Montane Meadow	Grama Grass	Dom-LF,LC	Mountain Meadow
	cf. Mountain Poa	Dom-LF,LC	
	Large Rabbitbrush	LF	
	Snakeweed	F	
	?Winterfat	LP	
Pinyon-Juniper Escarpments	Pinyon	Dom-LF	Pinyon-Juniper
	Juniper	Dom-LF	
	Holly Leak Oak	LF	
	Mountain Mahogany	LF	
Side-Canyon Riparian	Cottonwood	Dom—LF	Canyon Riparian
	Juniper	Dom-F	
	Ponderosa	Dom-LF	
	Willow	LF	
	Russian Olive	R	
	Pinyon	R	
	cf. Cholla	R	
	Large Rabbitbrush	LF	
	Grasses	LC	
	?Alder	LF	
Mesa Juniper-Grama Grass	Juniper	Dom-F	Juniper
	Grama	Dom-C	
	cf. Mountain Poa	LF	
	Snakeweed	LF	
	Small Rabbitbrush	LF	
	Cholla	R	
	Pinyon	R	
	Side Oats Grama	LC	
Mesa Juniper-Mixed Grasses	Juniper	Dom-LF	Juniper Grassland
	Grama Grass	Dom—LC	
	Galleta Grass	Dom-LC	
	?Muhlenbergia	LF	
	Large Rabbitbrush	LF	
	Small Rabbitbrush	LF	
	Snakeweed	LF	
	Three Awn	LF	

TABLE II.3.2 (cont.)

COMMUNITY	SPECIES	ABUNDANCE	ARIAL ZONE
Mesa Draw Juniper-Ponderosa	Juniper	Dom-F	Juniper
	Ponderosa	Dom-LF	
	Grama Grass	LC	
	Pinyon	LF	
	Large Rabbitbrush	LF	
Bosque Cottonwood	Cottonwood	Dom-C	Riparian
	Tamarisk	LF	
	Russian Olive	LF	
	Taller Grasses	LC	
Flood Plain Grasses	Under Cultivation/Pasture		Modern Fields
White Rock Canyon Riparian Juniper	Juniper	Dom-F	Juniper
	Gambles Oak	LF	
	Holly Leak Oak	LF	
	?Mountain Myrtle	LF	
	Cholla	LF	
	Prickly Pear	R	
	Apache Plume	LF	
	Hackberry	LF	
	Large Rabbitbrush	LF	
	Small Rabbitbrush	LF	
	Snakeweed	LF	
	Pinyon	R	
	Ash	R	
	cf. Poa	LF	
	Side Oats Grama	LF	
	Narrow-leaf Yucca	R	
	Gooseberry	R	
	Composite Shrub	LF	
	Sagebrush	LF	
White Rock Canyon Mountain Mahogany	Mountain Mahogany	Dom-F	Juniper
	Juniper	LF	
	Apache Plume	LF	
	Holly Leak Oak	LF	
	Broad-leaf Yucca	R	
	Pinyon	R	
	Grape	R	
	Large Rabbitbrush	LF	
	Small Rabbitbrush	LF	
White Rock Canyon Riparian Deciduous Woodland	?Cottonwood		Scrub Oak
	?Hackberry Deciduous Trees	Dom-LC	
	Large Shrubs	LF	
	Small Shrubs	LC	
White Rock Canyon Side Shrubs	Apache Plume	Dom-LF	Juniper
	Russian Olive	LF	
	Tamarisk	LF	
	Grasses	LC	
Bare Cliff Face	Small Shrubs	R	Yucca, cholla, prickly pear

TABLE II.3.3

PLANT ASSOCIATIONS WITHIN THE WHITE ROCK CANYON RIPARIAN JUNIPER COMMUNITY

ASSOCIATION	SPECIES	ABUNDANCE
Canyon Bottom Juniper	Juniper	Dom-F
	Grama Grass	LF
	Large Rabbitbrush	LF
	Small Rabbitbrush	LF
	Snakeweed	LF
	Prickly Pear	R
	Apache Plume	R
	Grape	R
	Deciduous Shrubs	R
Canyon Bottom Juniper-Holly Leaf Oak	(same as first, except)	
	Holly Leaf Oak	Dom-LF
Canyon Bottom Juniper-Hackberry	(same as first, except)	
	Hackberry	LF
	Mountain Myrtle	LF
Canyon Bottom Juniper-Cholla	(same as first, except)	
	Cholla	LF
Canyon Bottom Juniper-Gambles Oak	(same as first, except)	
	Gambles Oak	LF
Canyon Bottom Juniper-Sagebrush	(same as first, except)	
	Sagebrush	LF
Juniper-Grama Grass	Juniper	Dom-F
	Grama Grass	Dom-C
	Side Oats Grama	LC
	Poa Grass	LF
	Small Rabbitbrush	LF
	Snakeweed	LF
	Narrow-leaf Yucca	R
	Cholla	R
	Pinyon	R
	Gambles Oak	R
Canyon Side Juniper	Juniper	Dom-F
	Snakeweed	LF
	Grama Grass	LF
	Side Oats Grama	LF
	(taller grasses)	LF
	Pinyon	R
	Prickly Pear	R
Riverbank Apache Plume	Apache Plume	Dom-F
	Large Rabbitbrush	LF
	Small Rabbitbrush	LF
	Snakeweed	LF
	(taller grasses)	LF
River Flat	Snakeweed	LF
	(taller grasses)	F

If a plant appears in a transect frequency plot, its name is used in an abbreviated form (i.e. Jumo, above).

The indicators of the approximate degree of abundance are those used by Witter (1975):

D = dominant specis of the community.

C = common, or generally disturbed, forming about one third to one half of the ground cover.

LC = locally common, the same as common except that stands occur as clumps instead of being evenly distributed.

F = few; less than one third of the ground cover but not rare.

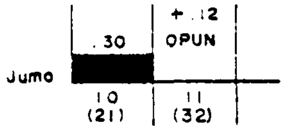
LF = locally few; the same as few except that stands occur as clumps.

R = rare; very occasional; often the only specimen to be seen.

In addition to the plant lists for the individual sites, a comprehensive check-list of plant species recorded in all study areas is given in Appendix II.3.A. The check-list also cites the known ethnobotanical references which quote nutritional, medicinal or other economic uses for the given plant.

1. Transect Plots

The transect plots are presented in a form which preserves and exhibits different distributional patterns of the species with one another and with the underlying terrain features. At the same time, quantitative information for computing areal density estimates is provided. An explanation of the transect plot shown below follows.



a. A species abbreviation ("Jumo") appears at the left of each row of sectors. The data within the boxes of that row apply to the species. Occasionally, since there are a limited number of rows per sheet, we insert data for a different species whenever necessary for the sake of compactness (the plus .12 OPUN").

b. The numbers appearing without parentheses at the bottom of each column of boxes ("10" and "11") are the transect sector numbers. The 3.5 m x 3.5 m quadrats in a transect are numbered consecutively.

c. The numbers within parentheses appearing below the sector numbers ("21" and "32") are the total number of plant units counted in that sector (quadrat). See below for the present meaning of "plant unit."

d. The decimal fractions which appear in each box ".30" and ".12") give the fraction of the total plant units in the quadrat which are represented by that particular species. This fraction is also given visually by a bar histogram within the box.

Given the above information, the notation used in the few quadrat arrays which are not linear should be self-explanatory.

2. Plant Units

All plant counts were made at "ground level." That is, the number of distinguishable discrete plants for each species which lay within the quadrat boundaries were literally counted whenever possible. This was possible for most of the minor (and some of the dominant) vegetation in the transects. For these,

one unit = one plant.

For certain types of vegetation, a discrete count is obviously not feasible. The areal coverage at ground level must be substituted for an actual count. For the present data, areal coverage was used for Apache plume (*Fallugia paradoxa)* and the grasses which are denoted collectively by the abbreviation GRAM in the plots. for these species,

one unit = 1 ft^2 (.093 m^2) of ground cover.

Stands of cholla and patches of pad cactus (generally, any of the *Opuntia* spp.) require an intermediate definition of the plant unit. For these species, we use:

one unit = one distinguishably discrete plant *or*, when bases are clumped 1 ft^2 of cover.

Thus, the areal coverage of *Opuntia* spp. may not be accurately inferred from the transect data. When in doubt, the 1 ft^2 cover definition should be used as the more realistic of the two alternatives.

VEGETATION SURVEY: SITE A

Date surveyed: April 5, 1975.

Location

Site A is the only survey area which is located on the east side of the river. It lies in the vicinity of 35° 40' 24" N latitude, 106° 18' 18" W longitude, and at the western edge of archeological site LA 12465.

Summary Description

The survey area lies on an old sand bar formed on the inner side of a deviation of the Rio Grande. The soil nearest the river is a sandy alluvium, light grey to buff in color, and grading into a stabilized colluvium which overlies basalt boulders near the canyon wall. Elevations along the transect run from 5283 ft (1610 m) to approximately 5300 ft (1616 m). The average slope over the transect is 7.5° (10° - 12° in the quadrats nearest the cliff face).

The plant community is White Rock Canyon Riparian Juniper; there is a low density of juniper and small deciduous shrubs. Within this community several distinct plant associations are observed. These are, starting at the river edge:

Canyon Bottom Juniper-Sagebrush Association;
Canyon Bottom Juniper-Cholla Association; and
Canyon Bottom Juniper Association, *or*
Canyon Bottom Juniper-Hackberry Association.

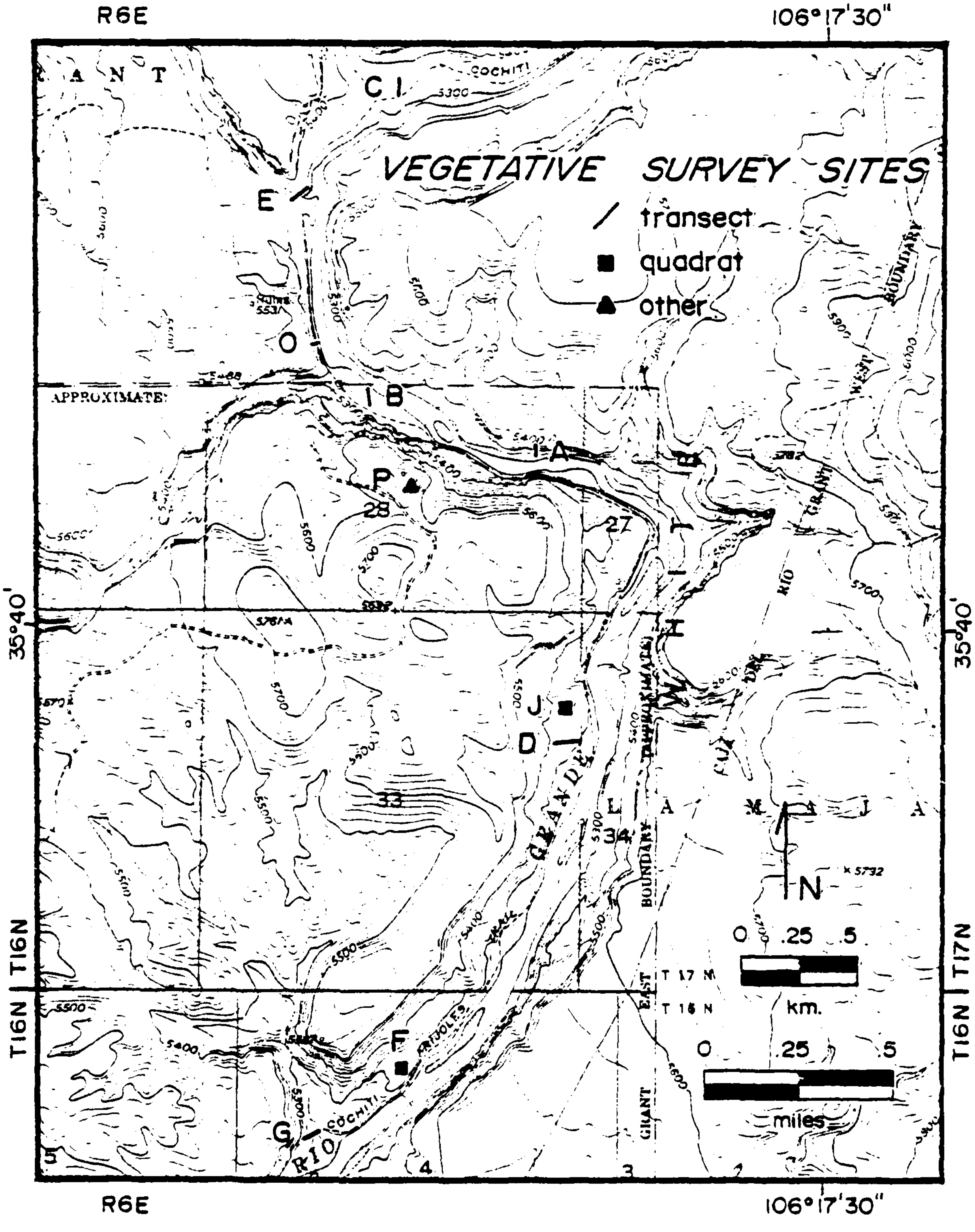


FIG. II.3.1 Location of Vegetative Survey Sites

The latter association is extensive and well-developed only at the junction of the sand bar and the colluvium layer at the base of the canyon wall.

LIST OF OBSERVED PLANT SPECIES: SITE A

Grasses:

LF	Bristle grass	*Setaria* spp.	
LF	Fescue	*Festuca* spp.	

Forbes and other:

LC	Snakeweed	*Gutierrezia* spp.	GUTI
LF	False tarragon	*Artemisia dracunculoides*	Ardr
LF	Tansy mustard	*Descurainia pinnata*	
LF-R	Dandelion	*Taraxacum* spp.	
LF-R	Clover	*Trifolium* spp.	
LF-R	Brickle bush	*Brickellia* spp.	
LF	Golden corydalis	*Corydalis aurea*	
LF	Nievitas	*Cryptantha Jamesii*	
R	Milk vetch	*Astragalus gracilis*	
R	Water leaf	*Phacelia Ivesiana*	
R	Mullein	*Verbascum thapsus*	

Trees and shrubs:

D-LF	One-seeded juniper	*Juniperus monosperma*	Jumo
D-LF	Netleaf hackberry	*Celtis reticulata*	Cere
LC	Sand sagebrush	*Artemisia filifolia*	Arfi
LC	Tree cholla	*Opuntia imbricata*	Opim
LF	Plains prickly pear	*Opuntia polyacantha*	Oppo
LF	Narrow-leaf yucca	*Yucca angustissima*	
LF-R	Banana yucca	*Yucca baccata*	
LF-R	Big sage (?)	*Artemisia* spp. (not *filifolia*)	ARTE
LF-R	Gooseberry	*Ribes leptanthum*	
LF-R	Wolfberry	*Lycium pallida*	
R	Chokecherry	*Prunus virginiana*	
R	Hop-tree	*Ptelea angustifolia*	
R	Mountain privet	*Forestiera neo-mexicana*	
R	Canyon grape	*Vitis arizonica*	
R	Club cholla	*Opuntia clavata*	
R	Buffalo gourd	*Cucurbita foetidissima*	

Comments on Site A

Figure II.3.2A is a transect through the survey site. The distribution and vigor of the local hackberry and juniper trees are not well-represented in the transect data. An approximate size range for these trees is noted below.

	Range of heights	Range of trunk diameters
C. reticulata	0.28 - 7.2m	0.6 - 33cm
J. monosperma	2.1 - 4.8m	16.5 - 26cm (for individual trunks)

The exposure at Site A is to the south and due to the orientation of the canyon at this point (nearly west to east), the exposure is potentially the most favorable of all the survey areas located on the canyon floor (see Fig.II.3.1).

Above survey area A, in the inaccessible cliff face, the visibly dominant vegetation on niches is prickly pear cactus and banana yucca.

Plant specimens, field numbers A-4307501 through A-4307504, were collected on April 30, 1975 from an area about 245 m northwest of the transect. These specimens are representative of a Canyon Bottom Juniper Association.

The survey area shows evidence of long-term grazing by cattle and possibly sheep. Cow dung and small rock enclosures were observed at the base of the cliff face behind the hackberry groves. The amount of natural debris in the rock enclosure suggests that they have not been used for livestock during the last three years.

VEGETATION SURVEY: SITE B

Date surveyed: April 8, 1975.

Location

Site B is in the vicinity of 35° 40' 30" N latitude, 106° 18' 51" W longitude, on the west side of the river, southeast of the mouth of Bland Canyon, approximately 75 m southeast of LA 12504.

Summary Description

The survey area is a southeastern extension of the alluvial fan formed at the junction of Bland Canyon with the Rio Grande. The river terrace nearest the Rio Grande is covered with small sand dunes; the next, higher terrace, is the old Bland Canyon outwash which is stabilized by sage and juniper up to the canyon wall. Soil is buff in color, with fine-grained sand in the dunes which grades into grey pebbly sand on the second terrace, and then to colluvium which is mixed with organic matter at the base of the talus slopes. The transect starts at 5282 ft (1610.4 m), 15 meters from the river edge, and rises to approximately 5310 ft (1619 m) at the base of the talus. The average inclination is 4.6°; and the exposure is greatest to the northeast.

The community on the second stabilized terrace is White Rock Canyon Riparian Juniper. The following distinguishable associations begin nearest the river and move toward the canyon wall:

Canyon Bottom Juniper Association;
Canyon Bottom Juniper-Sagebrush Association;
Canyon Bottom Juniper-Hackberry Association.

The existing plant association on the sand dunes nearest the river is not distinguished. It consists mostly of small forbs, scattered grass remnants and the remains of a Canyon Bottom Juniper Association.

LIST OF OBSERVED PLANT SPECIES: SITE B

Grasses:

LC	Grama	*Bouteloua* spp.	GRAM
LC-LF	Blue grama	*Bouteloua gracilis*	
LF	Poverty three-awn	*Aristida divaricata*	
LF	Six weeks fescue	*Festuca octoflora*	
LF-R	Dropseed	*Sporobolus* spp.	
R	Annual blue grass	*Poa annua*	

Forbs and other:

LC	Snakeweed	*Gutierrezia* spp.	GUTI
LC	Spiny aster	*Aplopappus spinulosus*	Apsp
LF	False tarragon	*Artemisia dracunculoides*	Ardr
LF	Cota	*Thelesperma longipes*	Thlo
LF	Borage	*Pectocarya setosa*	Pese
LF-R	Spectale pod	*Dithyrea Wislizeni*	
LF	Stickweed	*Lappula redowski*	

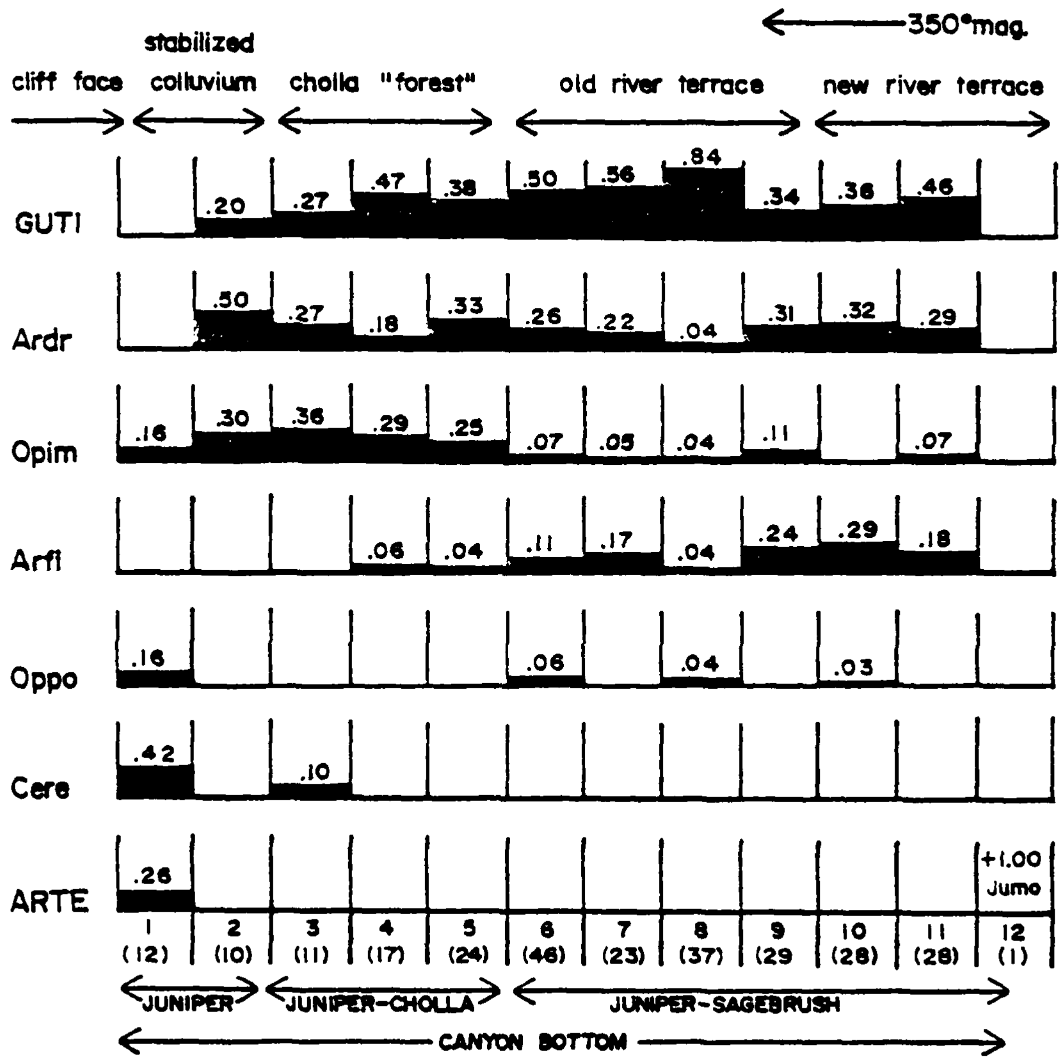


FIG. II.3.2A Vegetative Survey Site A

R	Whitlow grass	*Draba stenoloba*	
R	Cliff-brake	*Pellaea limitanea*	
R	Evening primrose	*Oenothera albicaulis*	

Trees and shrubs:

D-LF	One-seeded juniper	*Juniperus monosperma*	Jumo
LF-R	Netleaf hackberry	*Celtis reticulata*	Cere
R	Gooseberry	*Ribes leptanthum*	Rile
R	Mock orange	*Philadelphus* spp.	PHIL
LF	Rabbitbrush	*Chrysothamnus nauseosus*	Chna
D-LC	Big sagebrush	*Artemisia tridentata*	Artr
LF-R	Estafiata	*Artemisia frigida*	Arfr
LF-R	Whipple cholla	*Opuntia Whipplei*	Opwh, Opw
R	Prickly pear	*Opuntia polyacantha*	
R	Devil cholla	*Opuntia Stanyli*	
R	Prickly pear	*Opuntia phaeacantha*	
LF	Squaw bush	*Rhus trilobata*	

Comments on Site B

Fig.II.3.2B is a 109 m transect through the survey area. It is a fair representation of the areal density of junipers, particularly in the juniper-sage "park" sectors, and a good representation of the areal density of forbs and small shrubs.

The junipers on the sand dunes are large (up to 5.5 m high) and sparsely positioned. The size of the trees decreases as one moves into the "park" area; as the talus piles and canyon wall are approached, both tree size and areal density increase.

Approximate size ranges for the primary vegetation in this transect are given below.

	Height	Lateral width (cover)
J. monosperma	1.8 - 5.5m	2.1 - 7.3m
A. tridentata	45 - 95cm	64 - 122cm

VEGETATION SURVEY: SITE C

Date surveyed: April 9, 1975.

Location

Site C is in the vicinity of 35° 41' 12" N latitude, 106° 18' 42" W longitude, 150 m northeast of the mouth of Medio Canyon and on the west side of the Rio Grande. Associated archeological sites are LA 12488 and LA 12489.

Summary Description

The present site is similar to Site B in that it is an alluvial fan joined with an active river terrace of the Rio Grande. Sand dunes cover the active terrace, but are smaller than those at Site B. The texture of the underlying alluvium is coarse and includes large pebbles, water-washed cobbles and angular isolated basaltic boulders. Much of the active river terrace, which is adjacent to the present site, was submerged on the date of the survey.

The extremes of the transect elevation are approximately 5300-5345 ft (1616-1630 m). The average slope is 8°; the exposure is to the southeast.

The plant community on the stabilized alluvial fan is White Rock Canyon Riparian Juniper which contains an exclusive Canyon Bottom Juniper Association. There is a marked absence of *Artemesia;* deciduous shrubs are rare. Rabbitbrush is the dominant low shrub.

LIST OF OBSERVED PLANT SPECIES: SITE C

Grasses:

LF	Grama	*Bouteloua* spp.	GRAM

Forbs and other:

LC	Snakeweed	*Gutierrezia* spp.	GUTI
LF	Cota	*Thelesperma* spp.	Thel, The
LF	Tansy mustard	*Descurainia* spp.	Desc
LF-R	Aster	*Aplopappus* spp.	APLO, APL
LF-R	Cockleburr	*Xanthium saccharatum*	
R	Doveweed	*Croton* spp.	
R	Stinging nettle	*Urtica gracilenta*	
R	Milk vetch	*Astragalus* spp.	
R	Claret cup	*Echinocereus triglochidiatus*	

Trees and shrubs:

D-LF	One-seeded juniper	*Juniperus monosperma*	Jumo
R	Russian olive	*Elaeagnus angustifolia*	
R	Gray oak	*Quercus grisea*	
R	Netleaf hackberry	*Celtis reticulata*	
R	Pinyon pine	*Pinus edulis*	
D-LF	Rabbitbrush	*Chrysothamnus nauseosus*	
D-LF	"Green" rabbitbrush	*Chrysothamnus* spp. (*viscidiflorus?*)	CHRY
LF	Cholla	*Opuntia* spp.	
LF	Plains prickly pear	*Opuntia polyacantha*	Oppo
LF-R	Apache plume	*Fallugia paradoxa*	
D-LF	One-seeded juniper	*Juniperus monosperma*	Jumo

Comments on Site C

Fig.II.3.2C shows the vegetation distribution in a 105 m transect through Site C. A fair representation is shown for the areal density of junipers which increase from the river toward the talus pile, or lower canyon wall.

All observed vegetation, with the exception of rabbitbrush and snakeweed, increases in size as the colluvial layer near the canyon wall becomes thicker. The relation between size and distance from the canyon wall is the opposite for rabbitbrush; snakeweed apparently is uniform in size over the entire area.

Ranges of typical dimensions for the primary vegetation in the transect are as follows:

	Height	Lateral width (cover)
J. monosperma	1.7 - 5.1m	2.4 - 7.3m
Chrysothamnus spp.	30 - 64cm	30 - 131cm

Rabbitbrush along the active river terrace is large and has a definite blue color; it is identified as *Chrysothamnus nauseosus.* The dominant rabbitbrush on the old terrace has not been positively identified (despite their ubiquity, only winter specimens were obtainable); how-

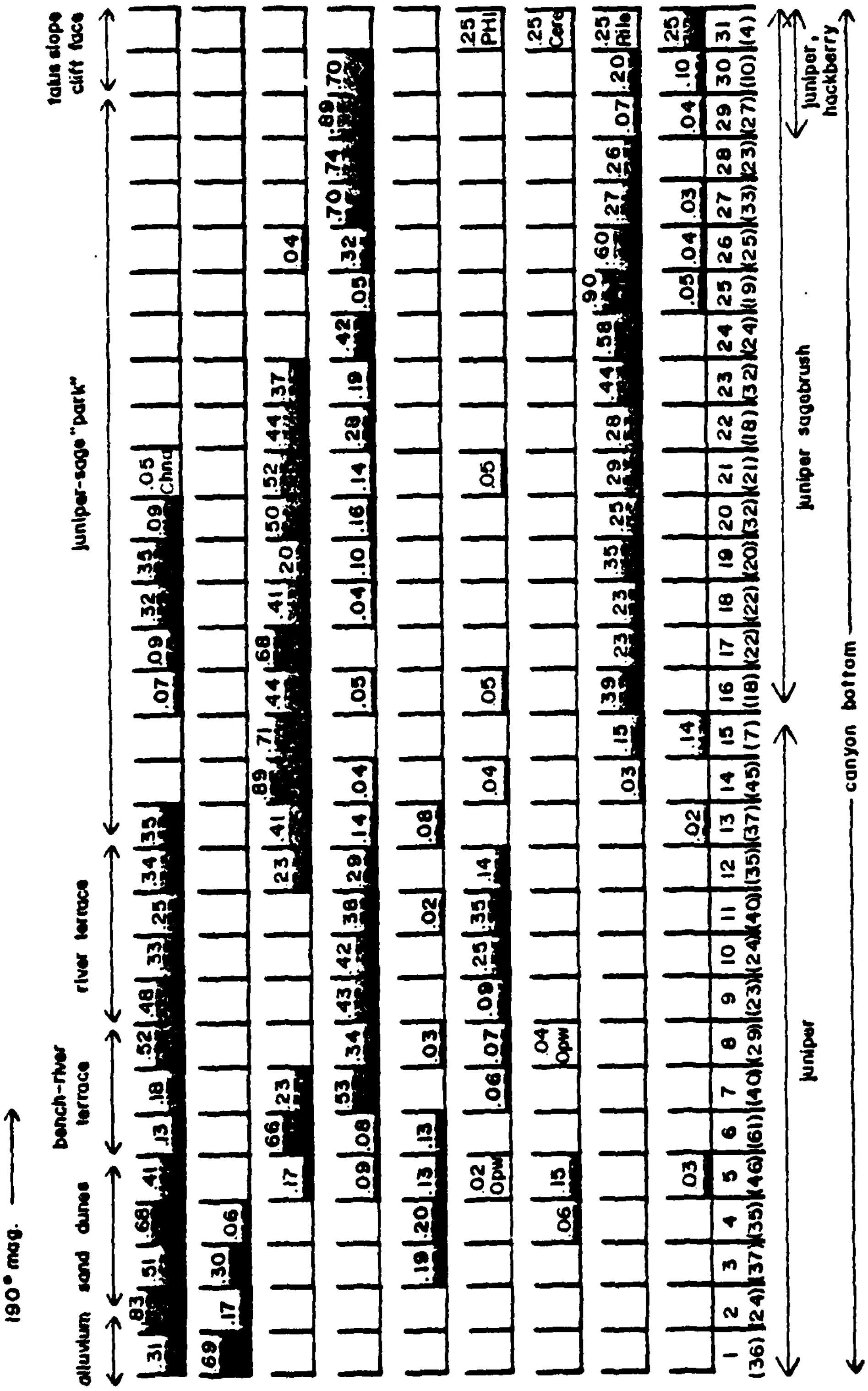


FIG. II.3.2B Vegetative Survey Site B

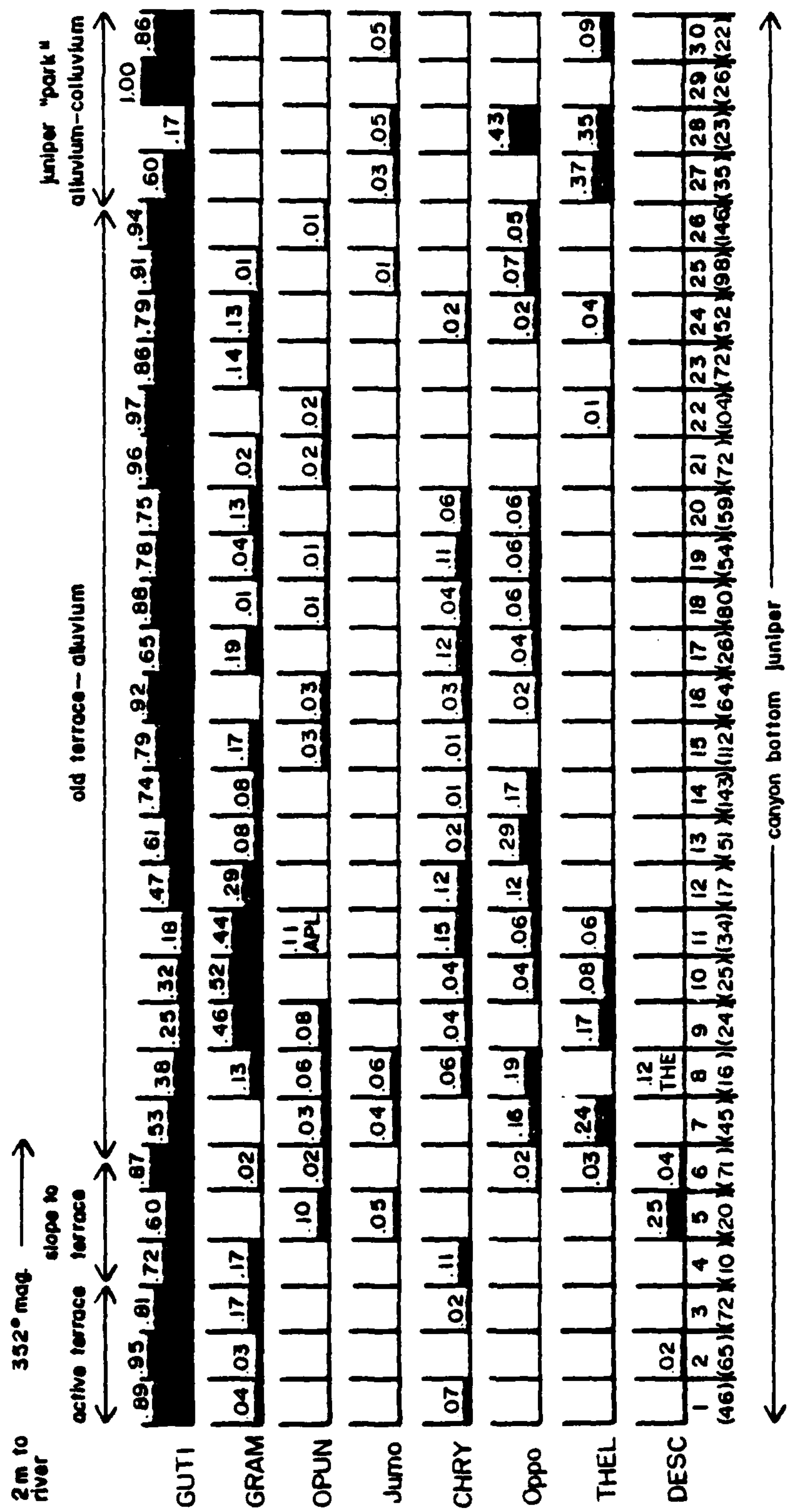


FIG. II.3.2C Vegetative Survey Site C

ever, they are a different species, most likely, representing *Chrysothamnus viscidiflorus*. A similar problem of identification also occurs with the grasses, and is compounded by the obvious signs of heavy grazing in the survey area (cattle hoof-prints, recent dung, jack-burro stations, browsed shrubs). Grass units in the transect were counted by estimating the footage covered by the closely cropped plants.

Low mounds (up to 25cm) of wind-blown sand are piled against the bases of rabbitbrush, prickly pear cactus and cholla.

The rare pinyon pines are all juvenile, seldom more than 12cm high, and are found invariably under the cover of large junipers.

VEGETATION SURVEY: SITE D

Date surveyed: April 10, 1975.

Location

Site D is near 35° 39' 21" N latitude, 106° 18' 9" W longitude, on the west bank of the river and is within the boundaries of LA 9138.

Summary Description

The present site is located on an inactive river terrace at the terminus of an old valley which extends to the west. The western margin of the river terrace is composed of a series of low rocky hills cut by shallow ravines: this situation contrasts to the talus piles and cliff faces which bound the other vegetation survey sites on the west bank of the river. The soil is mostly pebbles and sand with an occasional overlay of colluvium which is washed down from the hills to the west. Elevations range from approximately 5292 ft (1613 m), the river level elevation on the survey date, to about 5320 ft (1622 m) at the base of the hills. Inclination is 3° to 5°, while exposure is almost directly east; canyon walls on the opposing side of the river obscure the eastern horizon below 35° angular elevation.

All of the active river terrace, and about 30% of the old terrace, were submerged on the survey date.

The apparent plant community is a highly disturbed Mesa Juniper-Grama Grass Community, without perceptable associations. The ground cover, observable at this season, is comprised almost entirely of introduced plant species or species which are known to invade overgrazed or otherwise disturbed terrain.

LIST OF OBSERVED PLANT SPECIES: SITE D

Grasses:

LF	Blue grama	*Bouteloua gracilis*

Forbs and others:

D-LC	Snakeweed	*Gutierrezia* spp.
LF	Wolfberry	*Lycium* spp.
LF	False tarragon	*Artemisia dracunculoides*
LF	Thistle	*Cirsium* spp.
LF	Colorado rubberweed	*Hymenoxys* spp.
R	Silver horsenettle	*Solanum elaeagnifolium*
R	Spiny aster	*Aplopappus spinulosus*
R	Rattlesnake weed	*Euphorbia albomarginata*

Trees and shrubs:

D-LF	One-seeded juniper	*Juniperus monosperma*
R	Gray oak	*Quercus grisea*
R	Pinyon pine	*Pinus edulis*
R	Sand sagebrush	*Artemisia filifolia*
R	False indigo	*Amorpha* spp.
R	Tree cholla	*Opuntia imbricata* Ha.
R	Prickly pear	*Opuntia* spp.
R	Devil cholla	*Opuntia Stanyli*

Comments on Site D

Due to limitations of weather and time a transect count was not completed at this site. A count, however, was made in a randomly selected 3.5 m x 3.5 m quadrat with the following results:

PLANT	FRACTION
Graminae	0.56
LYCI	0.21
CIRC	0.12
Ardr	0.08
Opim	0.01
Opst	0.01
Soel	0.01

Exclusive of snakeweed 131 units were counted. The snakeweed cover at this particular site was at least 30%; a fair estimate of areal density for snakeweed would be about 43 units/m^2. The high density of snakeweed and exclusion of grass indicates that the area has received persistent disturbance and heavy grazing over a long period of time; a deduction which is consistent with the easy accessibility of the site from the west and the presence of historical ruins on the site.

The juniper of the surveyed area are large; their average height is 4.3 m with an average width (cover) of 7.6 m. Measurements of distance between junipers were taken; estimated local areal density was computed to be .0043/m^2.

The specimens, field numbers designated by "43075," were collected on April 30, 1975 at a point 150 m northwest of the survey area of April 10 and an elevation of 5340 ft (1628 m).

VEGETATION SURVEY: SITE E

Date Surveyed: April 11, 1975.

Location

Site E is located on the west side of the river near 35° 41' 0" N latitude, 106° 18' 57" W longitude. It lies between the archeological sites designated as LA 12477 and LA 12479 near the mouth of Sanchez Canyon.

Summary Description

The present survey area crosses the trough of Sanchez Canyon at a point where the latter joins White Rock Canyon. The soil is sand which is mixed with pebbles and river cobbles. On either side of the Sanchez Canyon bed are inactive terraces covered with wind-blown alluvium. Southwards of the canyon bed, and roughly parallel with the Rio Grande, the terrain grades to a stabilized colluvial layer partially covered with small sand dunes. The extremes in elevation over the survey

area range from 5300-5320 ft (1616-1622 m). The slope is about 6°, and the maximum exposure is to the northeast.

The plant community is a White Rock Canyon Riparian Juniper Community with a low density of deciduous trees and shrubs. The associations are, in order taken from the river bank:

Riverbank Apache Plume Association;
Canyonside Juniper Association.

The latter association is observed on both sides of the Sanchez Canyon river bed.

LIST OF OBSERVED PLANT SPECIES: SITE E

Grasses:

LC	Grama	*Bouteloua* spp.	GRAM
LC	Dropseed	*Sporobolus* spp.	

Forbs and other:

LC	Snakeweed	*Gutierrezia* spp.	GUTI
LC	False tarragon	*Artemisia dracunculoides*	Ardr Ard
LC	Spiny aster	*Aplopappus spinulosus*	Apsp Aps
LF	Cockleburr	*Xanthium* spp.	
R	Tansy mustard	*Descurainia pinnata*	
LF-R	Nievitas	*Cryptantha* spp.	
LF-R	Globe-mallow	*Sphaeralcea coccinea*	

Trees and shrubs:

D-LC	One-seeded juniper	*Juniperus monosperma*	Jumo
LF-R	Gooseberry	*Ribes inerme*	
R	Rocky mountain juniper	*Juniperus scopulorum*	

(The above individual is the only one seen in entire survey.)

DC	Apache plume	*Fallugia paradoxa*	Fapa
LF	Rabbitbrush	*Chrysothamnus nauseosus*	Chna
LF	Tree cholla	*Opuntia imbricata*	Opim
LF	Plains prickly pear	*Opuntia polyacantha*	Oppo
R	Hedgehog cactus	*Echinocereus* spp.	

Comments on Site E

Fig. II.3.2E shows the vegetative distribution in a transect 98 m long and extending diagonally across the flood plain of Sanchez Canyon. The transect starts approximately 48 m from the river bank, and follows the 250° mag. heading to the first talus slope on the south side of Sanchez Canyon.

A few of the one-seeded juniper trees within this provenience are the largest observed during the entire survey. One of the two trees in sector 13 (see transect, Fig. II.3.2E) was estimated to be 8 m high and 10.6 m wide (overstory or cover); this tree showed evidence of old axe cuts.

The single rocky mountain juniper was found next to sector 28 of the transect and near the talus pile.

The grass in the area appears to be exclusively grama (*Bouteloua* spp.), although only the headless pedestalled plants remained for an uncertain identification. Dropseed (*Sporobulus* spp.) was concentrated in the transect sectors 1 and 2 nearest the river.

VEGETATION SURVEY: SITE F

Date surveyed: April 16, 1975.

Location

Site F is located on the west side of the river near 35° 39' 0" N latitude, 106° 18' 39" W longitude. It is adjacent to LA 12513 and LA 12519 and is roughly 75m southeast of LA 12524.

Summary Description

The survey area is a valley located on a basaltic bench which lies on the west side of White Rock Canyon at elevations 5300 to 5320 ft (1616-1622 m). The valley is bounded on the east by a ridge of volcanic boulders, and on the west by talus cones and the canyon wall. The soil is a nonuniform mixture of wind deposited alluvium and colluvium stabilized by vegetation. Exposure is maximum to the northeast, but at all points is limited at ground level by the shadow of the ridge and cliff face. Slopes vary from flat to 6°.

The plant community in this small depression is similar to a Mesa Juniper-Grama Grass Community, but with an absence of *Poa* spp. Plant associations are not discernible on any spatial scale larger than a few meters (see comments on this site).

LIST OF OBSERVED SPECIES: SITE F

Grasses:

LC-LF	Blue grama	*Bouteloua gracilis*	GRAM
LF	Poverty three-awn	*Aristida divaricata*	
LF-R	Hairy grama	*Bouteloua hirsuta*	
LF-R	Tobosa grass	*Hilaria mutica*	
R	Indian rice grass	*Oryzopsis hymenoides*	

Forbs and other:

LF	Cota	*Thelesperma longipes*	Thlo
LF	Fleabane	*Erigeron* spp.	ERIG
LF	Snakeweed	*Gutierrezia* spp.	GUTI
LF	Russian thistle	*Salsola Kali*	Saka
LF-R	Spiny aster	*Aploppapus spinulosus*	
LF-R	Cockleburr	*Xanthium saccharatum*	
LF-R	Water leaf	*Phacelia* spp.	
R	Tansy mustard	*Descurainia* spp.	
R	Milk vetch	*Astragalus* spp.	
R	Globe-mallow	*Sphaeralcea coccinea*	
R	Locoweed	*Oxytropis Lambertii*	

Trees and shrubs:

D-F	One-seeded juniper	*Juniperus monosperma*	
LF	Rabbitbrush	*Chrysothamnus* spp.	CHRY
LF	Tree cholla	*Opuntia imbricata*	Opim
R	Club cholla	*Opuntia clavata*	Opcl
LF-R	Cockleburr	*Xanthium saccharatum*	
LF-R	Water leaf	*Phacelia* spp.	
LF	Rabbitbrush	*Chrysothamnus* spp.	CHRY
LF	Tree cholla	*Opuntia imbricata*	Opim

Comments on Site F

Fig. II.3.2F shows the results of a plant count in a randomly placed 3 x 3 array of quadrats each 3.5 m

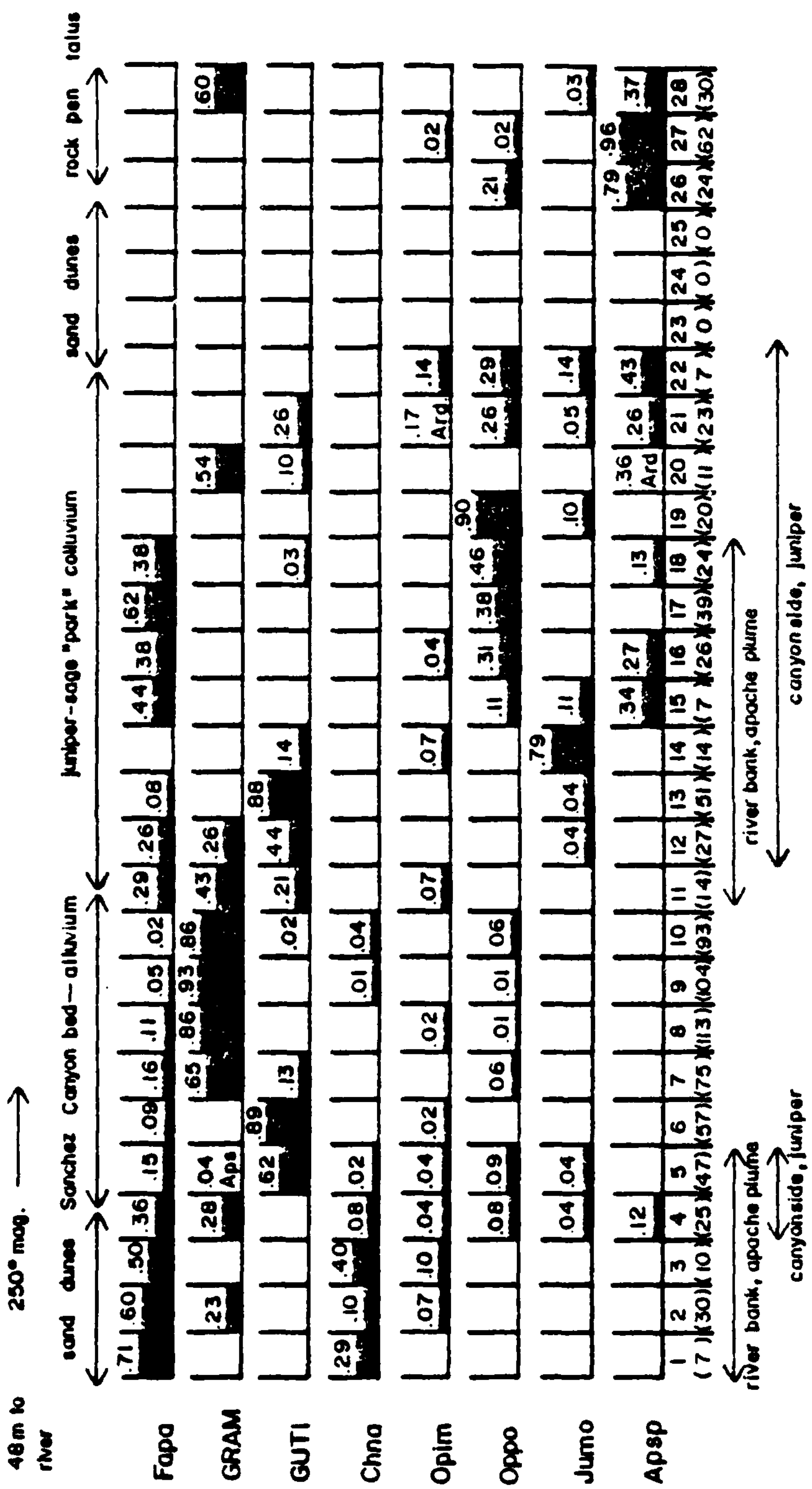


FIG. II.3.2E Vegetative Survey Site E

square. The quadrat array is more appropriate than a linear transect for this limited and relatively homogenous plant community.

FIG. II.3.2F

SITE F QUADRATS, 3 X 3 ARRAY
3.5 m squares

9 (37)	8 (50)	7 (45)
GRAM .65 ERIG .22 CHRY .08 GUTI .05	GRAM .86 GUTI .06 ERIG .04 Opim .02 OPUN .02	GRAM .87 GUTI .11 OPUN .02
6 (15)	5 (30)	4 (51)
GRAM .87 ERIG .13	GRAM .67 ERIG .11 Saka .10 CHRY .06 Thlo .06	GRAM .92 GUTI .04 ERIG .04
3 (14)	2 (18)	1 (37)
GRAM .50 ERIG .43 CHRY .07	GRAM .56 Thlo .17 Saka .17 CHRY .10	GRAM .73 Thlo .16 ERIG .05 GUTI .03 Saka .03

Junipers are not represented in the quadrat data; they are sparsely placed in the survey area with an average separation (mean of measured distances between individuals) of approximately 12 m and have an average height of approximately 4 m.

The Indian rice grass occurs exclusively on the small sand dunes which, here, are usually moist. This rice grass-sand dune "association" is the only apparent one within the community. The density of grasses on the site appears to be the largest of any found in the survey and is consistent with the site's general inaccessibility to cattle. Some signs of grazing were observed.

We suspect that at least two species of snakeweed *(Gutierrezia)* are present at this location, and possibly elsewhere in the survey region. The condition of the snakeweed specimens which were this early in the growing season does not permit a positive identification at the species level.

VEGETATION SURVEY: SITE G

Date surveyed: April 16, 1975.

Location

The survey area lies on a strip covering the sides and trough of a small canyon which opens into White Rock Canyon at an elevation of about 5300 ft (1616 m). The surveyed terrain begins near the canyon mouth and extends to slightly above 5340 ft (1628 m) elevation; inclinations vary from 8^o in the trough to over 30^o on the slopes of the canyon. Exposure is limited in all directions except those which are parallel to the canyon sides (approximately northwest to southeast). The canyon trough is composed of river cobbles, pebbles and sand all of which cover basalt boulders, the trough is mesic riparian in character. The canyon sides are volcanic colluvium, generally stabilized by vegetation and mixed with boulders from the surrounding talus slopes.

Summary Description

The plant community found on the sides of the canyon is an intrusion of Mesa Juniper-Grama Grass Community which covers the mesa tops above White Rock Canyon. The Canyonside Juniper Association is located within the community; near the mouth of the canyon, a relic of a Canyon Bottom Juniper Association with a marked absence of deciduous shrubs was observed. Apache plume is present, but is not dominant.

LIST OF OBSERVED PLANT SPECIES: SITE G

Note: Since plant counts were not made at Site G, the distribution of each species will be given qualitatively but with more detailed information in the following plant list. The notations "NE," "T," and "SW" which are appended to the indicators of rough abundance mean, respectively, the canyon side with NE exposure; the trough of the canyon; and the canyon side with SW exposure. The absence of these notations for any plant indicates that the species was *not observed* on that part of the survey site.

Grasses:

LC-NE, LF-SW	Side oats grama	*Bouteloua curtipendula*
LF-NE, LF-SW	Hairy grama	*Bouteloua hirsuta*
LC-SW	Poverty three-awn	*Aristida divaricata*
LF-SW, LF-NE	Blue grama	*Bouteloua gracilis*
(LF-R)-SW	Fluff grass	*Trideus pulchellus*
(LF-R)-SW	Tubosa grass	*Hilaria* spp.
R-SW	Blue grass	*Poa compressa*

Forbs and other:

LF-SW, (LF-R)-T	Bitterweed	*Hymenoxys acaulis*
LF-T, (LF-R)-SW	Spiny aster	*Aplopappus spinulosus*
LF-SW	Locoweed	*Oxytropis Lambertii*
(LF-R)-SW	Cota	*Thelesperma longipes*
LF-T	Snakeweed	*Gutierrezia* spp.
(LF-R)-T	Wild buckwheat	*Eriogonum leptocladon*
R-SW	Brickle bush	*Brickellia* spp.

Trees and shrubs:

D-F, SW density much less than NE density but greater than T density.	One-seeded juniper	*Juniperus monosperma*
(D-LF)-T	Rabbitbrush	*Chrysothamnus nauseosus*
LF-T	Apache plume	*Fallugia paradoxa*
LF-SW	Narrow-leaf yucca	*Yucca angustissima*
(LF-R)-SW	Indigo bush	*Dalea* spp.
R-SW	Plains prickly pear	*Opuntia polyacantha*

Comments on Site G

The apparent lack of annuals on the northeast facing slope is due to the difference in insolation received by the sides of the canyon at this time of the year. The annuals gathered on the southwest facing slope were at a more advanced stage of growth and were, therefore, more obvious to the observer.

The junipers in the bottom of the canyon and the

southwest slope have a mean separation of 15 m, while those on the northeast slope are separated, on the average, by a distance of 8 m.

VEGETATION SURVEY: SITE J

Date surveyed: April 17, 1975.

Location

Site J is approximately centered at 35° 39' 56" N latitude, 106° 18' 18" W longitude, on the west side of the canyon and is directly northwest of LA 9138 (see Vegetation Survey: Site D).

Summary Description

The present vegetation survey site is an old river terrace on the west side of White Rock Canyon. The terrace is the third one above the river level as of April 3, 1975. This site has the highest elevation of the vegetation areas which were studied: 5400 to 5420 ft (1646-1652 m). The exposure is directly to the southeast, a direction in which the terrain slopes downward by about 8°. The terrace is cut by small drainage channels, approximately 6 m wide and 0.5 m maximum depth, which originate on the boulder and river cobble hillsides which lie to the west; grasses and shrubs are concentrated on the sides of these drainage channels.

The plant community is White Rock Canyon Riparian with an intrusion of young pinyon pine and gray oak. The sub-association is exclusively a Canyon Side Juniper Association. As with Site D, the vegetation shows signs of persistent disturbance.

LIST OF OBSERVED PLANT SPECIES: SITE J

Grasses			
LC	Blue grama	*Bouteloua gracilis*	GRAM
LF	Poverty three-awn	*Aristida divaricata*	
LF-R	Side oats grama	*Bouteloua curtipendula*	
Forbs and others:			
LF	Milk vetch	*Astralagus Nuttalliannus*	Asnu
LF	Snakeweed	*Gutierrezia* spp.	GUTI
Trees and shrubs:			
D-F	One-seeded juniper	*Juniperus monosperma*	Jumo
LF	Gray oak	*Quercus grisea*	Qugr
LF	Pinyon pine	*Pinus edulis*	Pied
LF	Narrow-leaf yucca	*Yucca angustissima*	
R	Plains prickly pear	*Opuntia polyacantha*	Oppo

Comments on Site J

Fig. II.3.2J exhibits the results of a plant count in a randomly placed 3 x 3 array of quadrats, each 3.5 m on a side. A drainage channel runs to the southeast through the southern parts (top on quadrat diagram) of sectors 7 and 8.

The representation of areal density of all species appearing in the quadrats is adequate.

FIG. II.3.2J

SITE J QUADRATS, 3 X 3 ARRAY
3.5 m squares

9 (22)	8 (15)	7 (10)
GRAM .75 Asnu .25	GRAM .53 GUTI .27 Asnu .13	GRAM .50 GUTI .30 Qugr .10
6 (20)	**5 (16)**	**4 (19)**
GRAM .80 Asnu .20	GRAM .75 Asnu .25	GRAM .84 Asnu .11 Jumo .05
3 (20)	**2 (17)**	**1 (28)**
GRAM .90 Asnu .10	GRAM .53 Asnu .24 Qugr .24 Pied .05 Oppo .05	GRAM .71 Asnu .25 Oppo .04

The range of dimensions for the junipers in the survey area are 1.5 to 2.4 m for height, and 1.2 to 3.6 m for overstory diameter. The gray oak grows in a shrub-like form with typical dimensions of 1.35 m in height and 2 m in width. Pinyon pines are young, but a few bear cones; the largest pinyon observed was 1.4 m high.

On the top of the hill, northwest of the survey area, we found a man-made shelter built of old junipers and rocks. The wood in this crude shelter is weathered, but not disintegrating as the structure is supported by a rock foundation.

Several logs of ponderosa pine *(Pinus ponderosa)*, evidently cut by a metal axe, were found lying across one of the drainage channels; one of these logs was approximately 6 m long. There are no stumps, seedlings or other evidence of ponderosa within the surveyed area which suggests that these logs must have been carried into the area, or perhaps rolled down from the top of the canyon to the west.

We observed that virtually all of the narrow-leaf yucca in the survey site had been "harvested." The blades were cut off approximately a third of the distance up from the base of the plant, and rarely were more than one half of the plant blades cut off. The quantity of blades removed, and the manner of their removal, suggest use by local native craftsmen.

VEGETATION SURVEY: SITE O

Date surveyed: May 19, 1975.

Location

Site O is located in the vicinity of 35° 40' N latitude, 106° 18' 57" W longitude. It is on the west side of the river, approximately 150 m northeast of the mouth of Bland Canyon along the Cochiti-Frijoles Trail. Recorded archeological sites are not present within the survey area.

Summary Description

The survey area is a sequence of talus cones lying be tween the canyon cliff face and the river. The soil is a colluvium stabilized by vegetation on the talus cones, or is imbedded in voids between underlying basaltic boulders near the edge of the river. Elevations range from 5292 ft (1613 m) (river level on date of survey) to 5347 ft (1630 m). The average slope is 26°; and exposure is to the east.

The plant community is White Rock Canyon Riparian Juniper. Observed associations in an order from the river edge are: Canyon Bottom Juniper Association, and Canyon Side Juniper Association.

LIST OF OBSERVED PLANT SPECIES: SITE O

Grasses:

LF	Blue grama	*Bouteloua gracilis*	GRAM
LF	Side oats grama	*Bouteloua curtipendula*	
LF	Bottlebrush squirrel tail	*Sitanion hystrix*	
R	Kentucky blue grass	*Poa pratensis*	

Forbs and other:

LC	Whiplash erigeron	*Erigeron flagellaris*	Erfl
LF	False tarragon	*Artemisia dracunculoides*	Ardr
LF	Snakeweed	*Gutierrezia* spp.	GUTI
LF	Clover	*Melilotus* spp.	
LF-R	Pepper grass	*Lepidium medium*	
LF-R	Bitterweed	*Hymenoxys acaulis*	
LF-R	Milk vetch	*Astragalus lentiginosus*	
R	Milkweed	*Asclepias brachystephana*	
R	Verbena	*Verbena ciliata*	
R	Brickle bush	*Brickellia* spp.	
R	Stickweed	*Lappula Redowski*	
R	Mullein	*Verbascum Thapsus*	
R	Globe-mallow	*Sphaeralcea* spp.	
R	Milk vetch	*Astragalus gracilis*	

Trees and shrubs:

D-LF	One-seeded juniper	*Juniperus monosperma*	Jumo
LF	Gooseberry	*Ribes inerme*	Riin
LF	Netleaf hackberry	*Celtis reticulata*	
LF	Chokecherry	*Prunus virginiana*	Prvi
LF	Mountain privet	*Forestiera neo-mexicana*	Fone
LF-R	Canyon grape	*Vitis arizonica*	Viar
LF-R	Hop-tree	*Ptelea angustifolia*	
R	Pinyon pine	*Pinus edulis*	
LF	Estafiata	*Artemisia frigida*	Arfr
LF	Apache plume	*Fallugia paradoxa*	Fapa
LF-R	Narrow-leaf yucca	*Yucca angustissima*	
LF-R	Whipple cholla	*Opuntia Whipplei*	Opwh
R	Prickly pear cactus	*Opuntia* spp.	
R	Claret cup cactus	*Echinocereus triglochidiatus*	

Comments on Site O

Fig II.3.20 is a transect through the survey site along the direction of maximum slope (downhill). The transect is intended to show the relative placement of plant species rather than their density within the area. In particular, the juniper density is understated; separate measurements given a mean density of .032/m² for the juniper trees on the site. The representation of areal density for forbs and small shrubs is fair.

VEGETATION SURVEY: SITE P

Date surveyed: May 21, 1975.

Location

Survey Site P is a 300 m wide strip of terrain which extends for approximately 1.6 km along the western rim of White Rock Canyon at roughly the 5600 ft (1707 m) elevation. The strip starts 150 m northwest of a point on the mesa top directly above Site B and runs southeast to a point nearly opposite Site A which is across the canyon (see Fig.II.3.1).

The elevation at Site P is beyond the range of elevations to which this study is nominally limited. The material is included only for purposes of comparison and correlation with the plant species lists of the other survey sites located within the canyon. A species list for the 5600 ft (1707 m) level should also provide a point of continuity between the White Rock Canyon data and the data collected by Robertson (1968) for Bland Canyon and Cochiti Canyon.

Summary Description

The mesa top on the west side of White Rock Canyon is a series of low ridges and shallow drainage channels which are occasionally broken by outcrops of the underlying basalt which slope to the east. The inclination varies from approximately 5° to 30°; the exposure is generally to the east. The topsoil is largely sand mixed with, or covered by, an organic layer which measured 5 cm deep at various points.

The community is Mesa Juniper-Grama Grass; *Poa* spp. is absent, and is replaced with a mixture of *Aristida* and *Festuca*, or squirrel tail and rice grass, in disturbed areas.

LIST OF OBSERVED PLANT SPECIES: SITE P

The vegetation in disturbed areas is usually different in kind and distribution from that which is found in similar but undisturbed terrain. Since portions of Site P were altered by crude dirt roads, it will b useful to qualify, when necessary, the indicators of abundance (LC,R, etc.) at this site with combinations of certain symbols denoting each plant's topographic association. The symbols are:

DIST - disturbed ground (road cut)
TALUS - talus slopes
HILL - cobble covered hillsides

The absence of any of these symbols in the list below will indicate that the plant was observed on more or less normal undisturbed mesa-top grassland.

Grasses:

LC-LF	Blue grama	*Bouteloua gracilis*
LF	Red three-awn	*Aristida longiseta*
LF-DIST	Squirrel tail	*Sitanion hystrix*
LF-HILL	Six weeks fescue	*Festuca octoflora*
R-DIST	Indian rice grass	*Oryzopsis hymenoides*

Forbs and other:

R	Thistle	*Cirsium* spp.
R	Four o'clock	*Mirabilis multiflora*
R	Blazing star	*Mentzelia* spp.
LF-R	Globe-mallow	*Sphaeralcea coccinea*

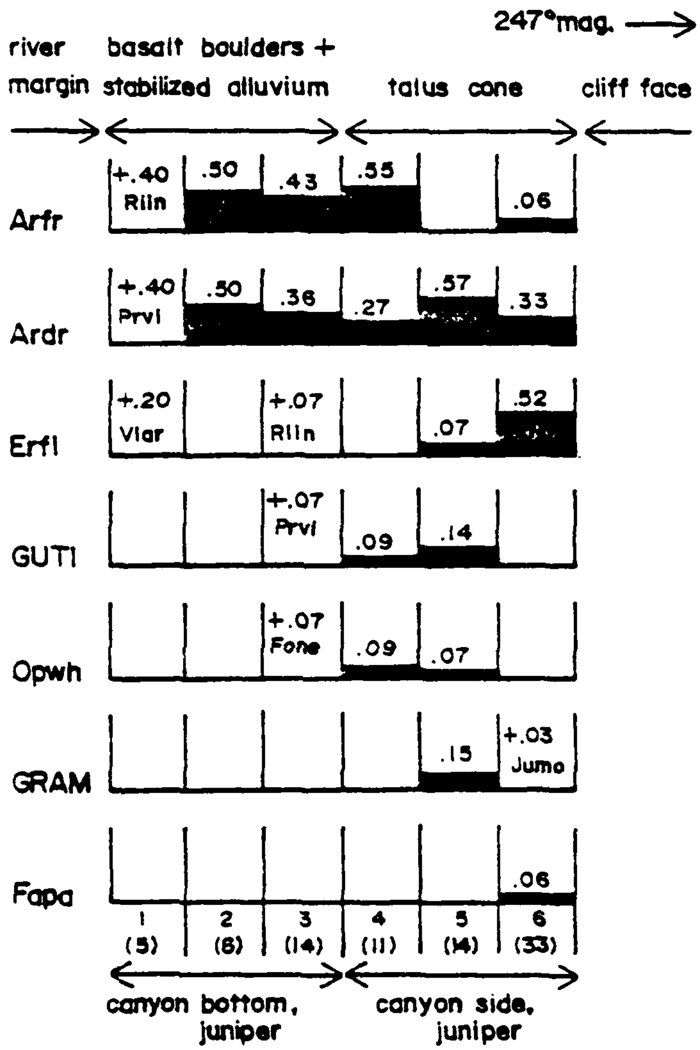


FIG. II.3.20 Vegetative Survey Site O

LF-R	Bahia	*Bahia Woodhousei*
LF-R	Indian paint brush	*Castilleja linariaefolia*
LF-HILL	Milk vetch	*Astragalus gracilis*
LF-DIST	Spiny aster	*Aplopappus spinulosus*
LF-DIST	Tansy mustard	*Descurainia* spp.
LF, LC-DIST	Snakeweed	*Guiterrezia* spp.
LF	Indian wheat	*Plantago Purshii*
LF	False tarragon	*Artemisia dracunculoides*
LF	Russian thistle	*Salsola Kali*
LF	Phlox	*Eriastrum diffusum*
LC	Bladderpod	*Lesquerella Fendleri*
(LF-R), DIST	Blanket flower	*Gaillardia pinnatifida*
R	Desert dandelion	*Melacothrix Fendleri*
LF	Bitterweed	*Hymenoxys acaulis*
R	Mariposa lily	*Calochortus ambiguus*
LF	Wild cosmos	*Leucampyx Newberryi*
R	Wild heliotrope	*Phacelia corrugata*
R	Wild buckwheat	*Eriogonum* spp.
R	Verbena	*Verbena* spp.
LF	Chamaya	*Cymopterus Fendleri*

Trees and shrubs:

LF-TALUS	Grizzlybear cactus	*Opuntia erinacea*
r	Apache plume	*Failugia paradoxa*
LF	Narrow-leaf yucca	*Yucca angustissima*
D-F	One-seeded juniper	*Juniperus monosperma*
LF-TALUS	Mock orange	*Philadelphus microphyllus*
(LF-R)-TALUS	Hop-tree	*Ptelea angustifolia*
LF-TALUS	Mountain privet	*Forestiera neo-mexicana*
LF-TALUS	Estafiata	*Artemisia frigida*

THE PLANT COMMUNITIES AND ASSOCIATIONS

In the summary descriptions of the data sections, the sites were tentatively assigned primary plant community and plant association designations based upon criteria which were proposed by Witter (see Tables II.3.2-3, of this report). How well do the data really fit the criteria? The reader may judge for himself after reading the following paragraphs. The quoted assignments of the species to abundance classes are repeated here for convenience.

Plant Communities

Only two of the thirteen communities, proposed by Witter, seem to be descriptive of the actual vegetation patterns observed in this study. These are the White Rock Canyon Riparian Community; and the Mesa Juniper-Grama Grass Community.

The nominal vegetation types and the corresponding abundance class distribution for the White Rock Canyon Riparian Juniper Community are as follows:

Juniper	D-F	Snakeweed	LF
Gambles oak	LF	Pinyon pine	R
Holly leaf oak ?	LF	Ash (probably Forestiera)	R
Hop-tree	LF	Poa	LF
Cholla	LF	Side oats grama	LF
Prickly pear	R	Narrow-leaf yucca	R
Apache plume	LF	Gosseberry	R
Hackberry	LF?	Composite shrub	LF
Rabbitbrush	LF	Sagebrush	LF

The vegetation patterns at Sites A, B, C, E, J and O are generally well-matched by the above criteria; however, some qualifications are necessary. Neither gambles oak nor holly leaf oak are recorded, anywhere, in the survey (though gray oak, *Quercus grisea*, is LF to R at most of these sites and is a highly variable species). Prickly pear (notably, *Opuntia polyacantha)* is definitely not rare at any of the sites, nor could the narrow-leaf yucca be considered a rare species. *Poa* grass is rare to absent in the survey area; however, this observation is probably an artifact of the study season. At least, the presence of *Poa pratensis* would be consistent with the observed high percentage of *increaser* species, i.e., those species of the climax vegetation which increase in percentage of foliage composition in response to grazing.

Given these qualifications, and making the obvious extrapolations, one may claim that *the White Rock Canyon Riparian Juniper Community broadly characterizes the vegetation stands which exist on the talus cones and slopes, the alluvial fans and the stabilized sand bars located within the trough* of White Rock Canyon.

The primary indicator of this community is the presence of a sandy relatively deep soil which is bedded and continuous, as on the alluvial fans, or is trapped in natural basins formed by the underlying irregular rock, as on the talus cones and slopes. The moisture retention is high in such soils (hence, the "riparian" character of the community) and, given favorable exposure, shrubs and trees grow to larger sizes than they would if located on the mesa top. For some proof of this assertion, see Fig. II.3.1 and note that junipers located on the river bottom and canyon sides generally have a larger cover (diameter) than those junipers located on the valley and flatlands above the canyon.

The nominal vegetation types and the corresponding abundance class distribution for the second community, the Mesa Juniper-Grama Grass Community, are as follows:

Juniper	D-f
Grama	D-C
Poa	D-C
Snakeweed	LF
Small rabbitbrush	LF
Cholla	R
Pinyon	R
Sideoats grama	LC

Because of the rare occurrence of deciduous shrubs and the more or less continuous grass cover, the Sites F, G and, of course, the mesa top Site P are best matched by the above criteria. Again, *Poa* spp. is absent or rare *(Poa compressa* at Site G and *Poa annua*, a grass introduced from Europe, at Site B). The *Opuntia* spp., other than cholla, are never absent.

The primary indicator of the community is a gently inclined, but locally stable soil which overlays rock rubble or solid outcrops and is sufficient to maintain only the root systems of grasses and small forbs over large areas. Occasional voids in the underlying strata allow the

development of trees and a few larger shrubs in a sparse pattern.

Thus, for the limited study area below the 5400 ft (1646 m) elevation, *the Mesa Juniper-Grama Grass Community broadly characterizes the vegetation stands on the higher slopes of tributary canyons and on certain elevated and isolated canyonside benches within White Rock Canyon.*

Plant Associations

Six of the ten plant associations, proposed by Witter, were observed at the survey sites.

1. **Canyon Bottom Juniper Association.** Witter postulates juniper as D-F, and rabbitbrush as the principle large shrub (LF). This association was observed at Sites A,B,C,G and O.

2. **Canyon Bottom Juniper-Sagebrush Association.** This association is the same as (1) except that sagebrush is the principal large shrub. It was observed at Sites A and B.

3. **Canyon Bottom Juniper-Cholla Association.** This association differs from (1) only in that cholla may locally co-dominate the overstory with juniper. It was observed at Site A.

4. **Canyon Bottom Juniper-Hackberry Association.** This association is the same as (1) except that hackberry and/or hop-tree may locally rival or co-dominate the overstory with juniper. Hackberry associations were observed at Sites A and B.

5. **Canyon Side Juniper Association.** This association is the same as (1) except that large shrubs or cacti are sparse or absent. Such conditions were observed on portions of Sites E, G, J and O.

6. **Riverbank Apache Plume Association.** Witter characterizes this association in the following way:

Apache plume	D-F
Rabbitbrush	LF
Snakeweed	LF
"Tall" grasses	LF

Examples of this pattern were observed at Site E on the margins of Sanchez Canyon.

To cover these observations, completely, we are compelled to introduce a seventh association which might be characterized by snakeweed (D-LC) and three or more species of weeds (LF), with shrubs and trees (other than juniper) rarely occurring. Examples of this pattern showed up at Site D exclusively, and on portions of Site J.

Certain environmental variables for the several sample areas can be correlated in an approximate fashion with the primary floral indicators of the generic associations listed above.

1. **Canyon Bottom Juniper Association** is characterized by rabbitbrush whose growth is favored by a shallow source of soil moisture. Thus, this association may occur on sandy tributary outwashes and semi-active alluvial flats, or occasionally in shallow sand at the base of cliff face drainages (see Site A).

2. **Canyon Bottom Juniper-Sagebrush Association** is characterized by sagebrush. Big sage (*Artemisia tridentata*) is known to be an indicator of well-drained relatively deep sandy non-alkaline soil and is often used as a guide to indicate good farming land (Kearney and Peebles 1964). Associations comprised of *A. tridentata* should be found, therefore, on stabilized inactive alluvial flats and sand bars which are well back from the river, or on the deeper layers of colluvium which are deposited at the base of talus slopes and cliff face drainages. We are unaware of conditions which favor the growth of sand sage, *A. filifolia*; however from evidence on the sites, it seems that this species occurs in stands which are closer to the river margins and, perhaps, is like rabbitbrush in the kind of substratum required for favorable growth. This ambiguity, and its analogue for other associations, should be kept in mind when one tries to apply these concepts and definitions to the preparation of resource estimates or vegetation maps from aerial photographs.

3. **Canyon Bottom Juniper-Cholla Association**, a pattern which requires the presence of cholla (here primarily *O. imbricata*) in dense local stands, is another ambiguity. It does occur in the survey area, possibly more often than the sample survey indicates (i.e., on the east side of White Rock Canyon); however, the environmental factors favoring cholla growth are unclear at present. The fact that cholla of one or another species is ubiquitous throughout the survey area, but seldom occurring in dense stands, suggests that its growth is determined by only a few environmental parameters, possibly exposure, and the rock structure underlying the topsoil. Limited present evidence (Site A) shows isolated cholla stands alternating occasionally with stands of sand sage as one moves approximately parallel to the river edge.

4. **Canyon Bottom Juniper-Hackberry Association** was only observed on the narrow (seldom more than 10 m wide) layer of colluvium which is built up at the base of talus slopes and cliff faces. The soil is sandy, stable and usually exceeds 50cm in depth. Because of the soil depth, moisture may be supplemented by seepage channels through the talus slopes. If exposure is important, it probably determines the vigor of the hackberry stands and not their location. Thus, the Juniper-Hackberry Association may occur along the base of cliffs and talus cones, but also it can be seen in isolated instances on canyon side basins of deep trapped soil.

5. **Canyon Side Juniper Association** evidently may occur where shallow soil cover rock rubble or solid rock strata; this terrain type is similar to that which favors the Mesa Juniper-Grama Grass Community. This association could not be distinguished from manifestations of the latter community if it did not appear as a hiatus within shrub-covered areas occupied by the other associations (1) through (4), and (6) below. Therefore, the Canyon Side Juniper Association may occur on the sides of tributary canyons (where it could be indistinguishable from intrusions of the Mesa Juniper communities); or in isolated patches on talus cones, usually about half way up from the base where the graduation of the fractured rock is too fine to permit deep soil-filled voids (see Site O). Other substratum conditions, which are necessary for the association's presence can be easily postulated. For instance, at Site A, the association was evident wherever a shallow sand overlayed coarse gravel beds near certain cliff face drainages.

6. The River Apache Plume Association, in which *F. paradoxa* exists with and dominates rabbitbrush, appears commonly, but not exclusively, on the margins of tributary canyon washes and on the banks of intermittent streams. Evidently, some of the conditions favorable for the Canyon Bottom Juniper Association are necessary, but not sufficient, for the Apache Plume Association. The additional conditions needed by Apache plume are not obvious, and do not necessarily include degree of exposure or substratum texture. The margins of Sanchez Canyon (Site E) supported extensive growth of Apache plume, yet the species was rare at Medio Canyon (*Site C) which is superficially similar to Site* E in its gross environmental parameters. Differences in grazing intensity do not provide an answer since, while the shrub is browsed, to our knowledge, it is not favored by animals as forage.

AN ETHNOBOTANICAL NOTE

The list of plants which are recorded in Appendix II.3.A should not be considered a complete inventory of the survey area. Not only was the area heavily grazed, but also the term of the survey was unseasonal. Nevertheless, certain data regarding the vegetative resources of the area are worth mentioning.

Of approximately 130 plant specimens collected, some 100 species were identified. Certain immature or winter specimens could not be positively identified. Of the 100 identified species, 63 native plants were found to be potentially useful to man (other than as forage). Of these useful plants, 33 are edible. Also, there are 15 specimens (denoted by an asterisk in the list of Appendix II.3.A) whose usefulness has not been specifically recorded but which are either closely related (same genera) to plants of known use or, as is often the case with recorded ethnobotanies, the plant in use was not identified to species in the literature but only to the genus. (only 5 of the 100 species identified for the area are introduced species.)

The earliest edible spring greens which appeared in the survey area were: false tarragon, chimaya, clover, mariposa lily and pepper grass.

APPENDIX

Annotated List of Collected Plants

The following list of approximately one hundred plants is arranged alphabetically with respect to plant genus. Specimens of these plants suitable for preservation now reside at the Herbarium of the Department of Biology, University of New Mexico, Albuquerque.

The first column of the list gives the field numbers of the specimens. The leading letter of the field number keys the specimen to the survey site where it was recorded. Herbarium voucher numbers were not available at the time this report was compiled. The second column gives the plant genus and the plant species if it is known. The third column gives a common name for the plant. The fourth and fifth columns give the known utility of the plant for man, and the author and date for the publication(s) in which they are mentioned.

TABLE II.3.4

ANNOTATED LIST OF COLLECTED PLANTS

FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
D 43075	*Amorpha* spp.	false indigo		
P 52175-1	*Aplopappus spinulosus* (Pursh.) DC.	spiny golden weed	snuff medicine	Wyman and Harris (1941)
B 4975-9	*Aristida divaricata* Humb. and Bonpl.	poverty three-awn		
P 52175-18	*Aristida longiseta* Steud.	red thre[illegible]wn	medicine	Swank (1932)
A 4575-6	*Artemisia dracunculoides* Pursh.	false tarragon	edible	Fewkes (1896)
A 4575-3	*Artemisia filifolia* Torr.	sand sagebrush	edible medicinal ceremonial	Kirk (1970) Vines (1960) Voth (1901)
O 51975-15 P 52175-17 B 4975-20	*Artemisia frigida* Willd.	estafiata	edible ceremonial medicinal	Kirk (1970) Whiting (1966) Kearney and Peebles (1964)
B 4975-14	*Artemisia tridentata* Nutt.	big sagebrush	edible medicinal	Kirk (1970) Whiting (1966)
O 51975-14	*Asclepias brachystephana* Engelm.	milkweed	*medicinal *edible *papain substitute	Whiting (1966) Fewkes (1896) Cook (1930)
P 52175-13	*Astragalus gracilis* Nutt.	milk vetch	*medicinal	Sweet (1962)

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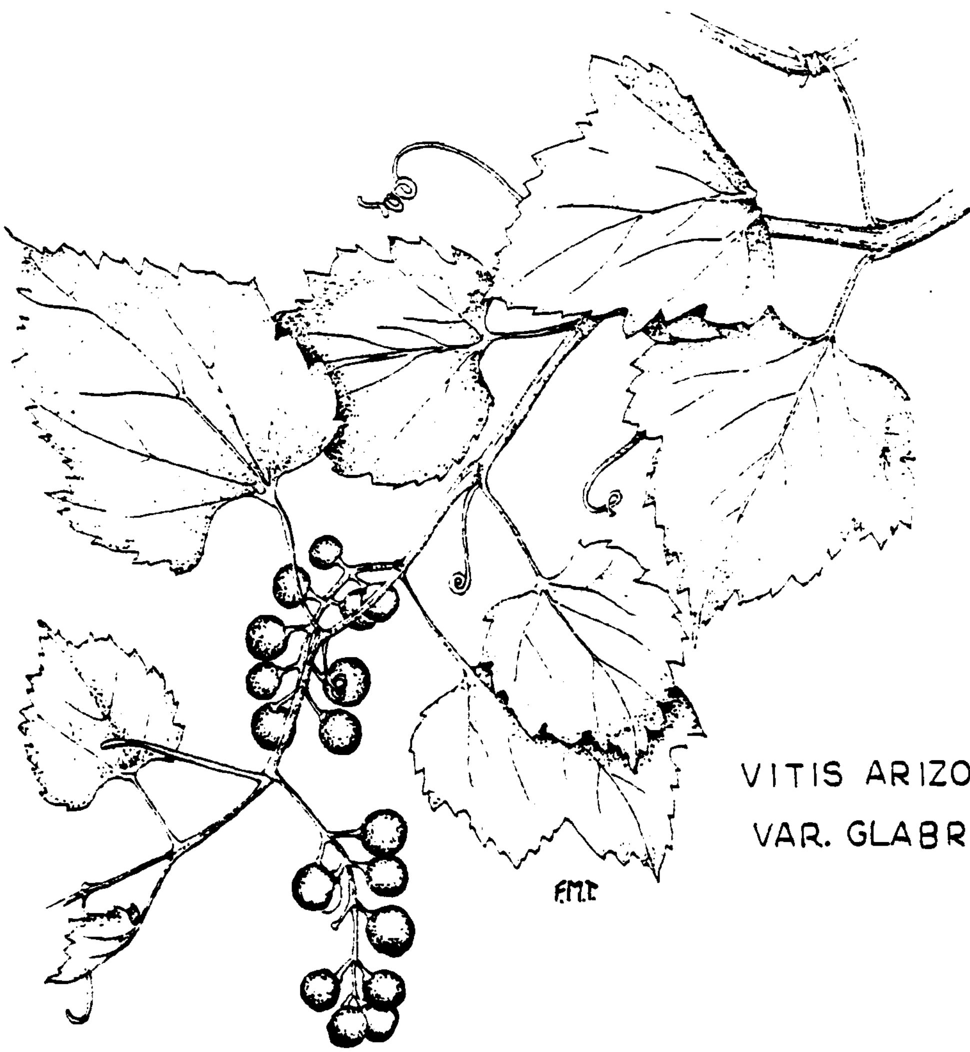
FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
J 41775-2	*Astragalus Nuttallianus* DC.	milk vetch	*medicinal	Sweet (1962)
O 51975-12	*Astragalus lentiginosus* var. diphysus (Gray) Jones	blue loco	edible	Stevenson (1909)
P 52175-3	*Bahia Woodhousei* Gray	bahia	medicinal	Stevenson (1909)
B 4975-7 F 41675-3	*Bouteloua gracilis* (H.B.K.) Lag.	blue grama	basket fill *hair brush	Whiting (1966) Whiting (1966)
I 41675-2 F 41675-12	*Bouteloua hirsuta* Lag.	hairy grama	*basket fill *hair brush	Whiting (1966) Whiting (1966)
I 41675-1	*Bouteloua curtipendula* (Michx.) Torr.	side oats grama		
A 4575-15 H 41675-2 O 51975-9	*Brickellia* spp.	brickle bush	medicinal *ceremonial	Wyman (1941) Wyman (1941)
P 52175-10	*Calcochortus ambiguus* (Jones) Quimbey	mariposa lily	edible *ceremonial	Kearney and Peebles (1964) Wyman (1941)
P 52175-4	*Castilleja linariaefolia*	paint brush	medicinal ceremonial paint	Voth (1901) Robbins et. al. (1916) Hough (1907)
C 4375-2 O 51975-4 A 4575-1	*Celtis reticulata* Torr.	netleaf hackberry	edible fence post	Kearney and Peebles (1964) Kearney and Peebles (1964)
B 4975-10	*Chrysothamnus nauseosus* (Pall.) Britton	rabbitbrush	dye wicker-work	Stevenson (1909) Stevenson (1909)
C 4975-1 C 4975-2	*Chrysothamnus* spp.	rabbitbrush	medicinal ceremonial kiva fuel building mat. arrows	Cook (1930) Voth (1901) Whiting (1966) Whiting (1966) Whiting (1966)
D 41075-4	*Cirsium* spp.	thistle	medicinal edible *clan name	Kearney and Peebles (1964) Bennett and Zingg (1935) Whiting (1966)
A 4575-9	*Corydalis aurea* Willd.	golden corydalis	medicinal	Wyman and Harris (1941)
C 4975-8	*Croton* spp.	doveweed	*medicinal	Cook (1930)
A 4575-10	*Cryptantha Jamesii* (Torr.) Payson	borage	medicinal	Whiting (1966)
A 4575-13	*Cucurbita foetidissima*	buffalo gourd	edible soap medicinal hair oil ceremonial insecticide at Cochiti	Neithhammer (1969) Neithhammer (1969) Neithhammer (1969) Neithhammer (1969) Neithhammer (1969) (Author's files, 1970)
P 52175-26	*Cymopterus Fendleri* Gray	chimaya	edible (eaten at Cochiti)	(Author's files,1970)
A 4575-8	*Descurainia pinnata*	tansy mustard	edible medicinal	Kearney and Peebles (1964) Kearney and Peebles (1964)
B 4975-23 B 4375-1	*Dithyrea Wislizeni*	spectacle pod	medicinal ceremonial	Stevenson (1909) Stevenson (1909)
B 4975-16	*Draba stenoloba* Ledeb.	whitlow grass		

FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
C 4975-6	*Echinocereus* spp.	hedgehog cactus	edible	Kearney and Peebles (1964)
O 51975-20	*Echinocereus triglochidiatus* var. neo mexicanus Standley	claret cup	edible	Kearney and Peebles (1964)
C 4975-5	*Elaeagnus angustifolia* L.	Russian olive (Introduced)	edible	Lamb (1974)
O 51975-7	*Erigeron flagellaris* Gray (E. Macdougalii Heller)	whiplash erigeron	medicinal	Wyman and Harris (19410
P 52175-19	*Eriogonum* spp.	wild buckwheat	medicinal ceremonial	Sweet (1962) Whiting (1966) Wyman and Harris (1941)
H 41675-1	*Eriogonum leptocladon*	wild buckwheat	*ceremonial *medicinal	Wyman and Harris (1941) Sweet (1962) Whiting (1966)
D 43075-3	*Euphorbia albomarginata* Torr. and Gray	spurge	medicinal	Kearney and Peebles (1964)
B 4975-29	*Fallugia paradoxa* (D. Don) Endl.	Apache plume	brooms arrows ceremonial hair tonic	Cook (1930) Whiting (1966) Whiting (1966) Hough (1907)
A 4575-25	*Festuca* spp.	fescue		
P 52175-23 B 43075-3	*Festuca octoflora* Walt.	six weeks fescue		
P 52175-11 A 43075-4 B 4975-27	*Forestiera neo-mexicana* A. Gray	mountain privet	digging stick medicinal ceremonial	Whiting (1966) Wyman and Harris (1941)
P 52175-3	*Gaillardia pinnatifida*	blanket flower	medicinal	Whiting (1966)
P 52175-14	*Gilia pumila* Nutt, Grant	phlox	*medicinal	Kearney and Peebles (1964)
F 41675-11	*Gutierrezia Sarothrae*	snakeweed	chewing gum medicinal	Krenetsky (1964) Cook (1930) Robbins, et. al. (1916) Weiner (1972)
A 4575-19	*Gutierrezia microcephala* C. Gray	snakeweed	brooms	Krenetsky (1964)
F 41675-7	*Hilaria mutica* (Buckl.) Benth.	tobosa grass	*basket fill	Whiting (1966)
P 52175-9	*Hymenoxys acaulis* (Pursh.) K.F. Parker	bitterweed	analgesic stimulant beverage medicinal	Whiting (1966) Whiting (1966) Jones (1931) Jones (1931)
A 4575-18	*Juniperus monosperma* (Engelm.) Sarg.	one-seeded juniper	building mat. medicinal edible plant ceremonial	Cook (1930) Cook (1930) Cook (1930) Cook (1930) Whiting (1966)
E 41175	*Juniperus scopulorum*	Rocky Mountain juniper	building mat. medicinal edible paint ceremonial	Cook (1930) Cook (1930) Cook (1930) Whiting (1966) Whiting (1966)

FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
O 51975-17	*Lappula Redowski* (Homem.) Greene	stickweed		
O 51975-16	*Lepidium medium* Greene	pepper grass	edible	Bennett and Zingg (1935)
P 52175-2	*Lesquerella Fendleri* (Gray) Wats	bladderpod	*medicinal *ceremonial	Whiting (1966) Whiting (1966)
P 52175-12	*Leucampyx Newberryi* Gray	wild cosmos	medicinal	Jones (1931)
D 41075-3	*Lycium* spp.	wolfberry	*edible	Whiting (1966)
A 4575-5	*Lycium pallidum*	wolfberry	edible ceremonial	Whiting (1966) Whiting (1966)
P 52175-8	*Melacothrix Fendleri* Gray	desert dandelion		
B 43075-4	*Oenothera albicaulis* Pursh.	evening primrose	*edible *medicinal *ceremonial	Harrington (1967) Curtain (1965) Whiting (1966)
A 4575-27	*Opuntia clavata*	club cholla	medicinal edible	Swank (1932)
P 52175-25	*Opuntia erinacea*	grizzlybear cactus		
A 4575-2	*Opuntia imbricata* Ha.	tree cholla	edible medicinal mordant	Neithhammer (1969) Weiner (1972) Vines (1960)
B 4875-26	*Opuntia phaeacantha* Engelm.	prickly pear		
A 4575-12	*Opuntia polyacantha* var. juniperina (Engelm.) L. Benson	plains prickly pear	edible	Whiting (1966)
C 4975-4 B 4975-23 B 4975-24	*Opuntia polyacantha* var. rufispina (Engelm.) L. Benson	plains prickly pear	edible	Whiting (1966)
B 4975-25	*Opuntia Stanyli* Engelm.	devil cholla		
B 4975-4	*Opuntia Whipplei* Engelm. and Bigel.	whipple cholla	edible medicinal	Neithhammer (1969) Weiner (1972)
P 52175-23b	*Oryzopsis hymenoides* (Roem. and Shult.) Ricker	rice grass	edible	Vines (1960)
F 41675-5	*Oxytropis Lambertii* Pursh.	locoweed	medicinal ceremonial	Wyman and Harris (1941) Wyman and Harris (1941
B 43075-2	*Pectocarya setosa* Gray	borage		
B 4975-18	*Pellaea limitanea* (Maxon) Morton	cliff-brake		
P 52175-17b	*Phacelia corrugata* A. Nels.	wild heliotrope		
P 52175-24 B 4975-12	*Philadelphus micro-phyllus* Gray	mock orange	edible	Jones (1931)
J 41775-4	*Pinus edulis* Engelm.	pinyon pine	edible glue waterproofing ceremonial paint	Whiting (1966) Whiting (1966) Whiting (1966) Whiting (1966) Cook (1930)
P 52175-15	*Plantago Purshii* Roem. and Schultz	Indian wheat	*edible medicinal	Bennett and Zingg (1935) Kearney and Peebles (1964)

FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
B 4975-19	*Poa annua* L.	annual blue grass (introduced)		Kearney and Peebles (1964)
G 41675-7	*Poa compressa* L.	blue grass		
O 51975-18	*Poa pratensis* L.	Kentucky blue grass		
A 43075-1	*Prunus virginiana* A.	common chokecherry	edible *bows	Nelson (1969) Jones (1931)
A 43075-3	*Ptelea angustifolia* Benth.	hop-tree	in bread/brewing medicinal	Kearney and Peebles (1964) Bennett and Zingg (1935)
D 43075-4 C 43075-1 J 41775-3	*Quercus grisea* Liebm.	gray oak	edible berries posts tanning *edible leaves *rabbit stick *arrows ceremonial	Kearney and Peebles (1964) Kearney and Peebles (1964) Kearney and Peebles (1964) Bennett and Zingg (1935) Whiting (1966) Whiting (1966) Whiting (1966)
B 4975-13	*Rhus trilobata* Nutt.	squaw bush	edible berries mordant wicker baskets hoe handles	Kearney and Peebles (1964) Kearney and Peebles (1964) Cook (1930) Cook (1930)
A 4575-4	*Ribes leptanthum* Gray	gooseberry	*edible	Kearney and Peebles (1964)
O 51975-5	*Ribes inerme* Rydb.	gooseberry	edible	Nelson (1969)
F 41675-6	*Salsola Kali* L.	Russian thistle (introduced)	edible	Kirk (1970)
A 4575-24	*Setaria* spp.	bristle grass		
P 052175-21 O 51975-19 P 52175-20	*Sitanion hystrix* (Nutt.) J.G. Smith	squirrel tail	witchcraft	Wyman and Harris (1941)
D 41075-2	*Solanum elaeagnifolium* Cav.	silver horsenettle	papain subst. medicinal ceremonial	Kirk (1970) Jones (1931) Whiting (1966)
E 43075-1 P 52175-6	*Sphaeralcea coccinea* (Pursh.) Rydb.	globe-mallow	medicinal, as in casts *edible *medicinal	Krenetsky (1964) Whiting (1966) Whiting (1966)
B 4975-21	*Sporobolus* spp.	dropseed	*edible	Whiting (1966)
B 4975-30	*Tamarix pentandra* Pallis.	salt cedar (introduced)		
A 4575-22	*Taraxacum* spp.	dandelion (introduced)	edible	Kearney and Peebles (1964)
F41675-1	*Thelesperma longipes cota* Gray	cota	tea medicinal dye	Jones (1931)
G 41675-1	*Tridens pulchellus*	fluff grass		
A 4575-7	*Trifolium* spp.	clover	edible medicinal	Kearney and Peebles (1964) Curtain (1965)
C 4975-9	*Urtica gracilenta* Greene	stinging nettle	*medicinal *fiber edible	Wyman and Harris (1941) Sweet (1962) Sweet (1962)
A 4575-14	*Verbascum Thapsus* L.	common mullein	tobacco subst. medicinal	Whiting (1966) Whiting (1966)

FIELD NUMBERS	SCIENTIFIC NAME	COMMON NAME	UTILITY	REFERENCE
O 51975-10	*Verbena ciliata*	verbena	*medicinal	Bennett and Zingg (1935)
A 43075-2	*Vitis* spp.	wild grape	cultivated	Whiting (1966)
B 4975-28 O 51975-6	*Vitis arizonica* Engelm.	wild grape	edible	Weiner (1972)
C 4875-3	*Xanthium saccharatum*	cockleburr	*medicinal	Cook (1930)
A 4575-17	*Yucca angustissima* Engelm.	narrow-leaf yucca	paint brush varnish medicinal soap basketry fiber	Whiting (1966) Whiting (1966) Whiting (1966) Whiting (1966) Whiting (1966) Whiting (1966)
A 4575-16	*Yucca baccata* Torr.	broad-leaf yucca	edible soap basketry fiber	Whiting (1966) Whiting (1966) Whiting (1966) Whiting (1966)



VITIS ARIZONICA
VAR. GLABRA

FIG. II.4.1 Faunal petroglyphs from various sites within White Rock Canyon.

II.4
Faunal Resources in the Cochiti Study Area

PATRICIA J. MARCHIANDO

INTRODUCTION

The purpose of this discussion is to describe and delineate past and recent faunal resources available to man in the Cochiti area. By synthesizing the existing faunal distribution, activity and behavior, we hope to define some subsistence strategies used by man through the several millenia he has inhabited the region. If we can isolate those periods in the life cycles of mammals, birds, and fishes when they are most vulnerable (e.g., during mating season, during the birth season) or most available (when aggregating to migrate), perhaps we can determine the types of procurement strategies utilized by past human populations.

The following descriptions include the life zones within the study area and the mammalian populations which are economically important as food or fur resources. These focus upon the mammalian habitats, range, behavioral and physical characteristics. A similar description will follow for birds and fishes. This discussion of food animals will not include the invertebrates; reptiles and amphibians are disregarded because they do not occur in sufficient numbers to be important as a food source. A discussion of usable meat for mammals and birds follows the descriptive section.

This species list was derived, in part, from faunal remains at archeological sites (Harris 1968), ethnographic accounts of proto-historic hunting practices (Lange 1959; Henderson and Harrington 1914), from the *Environmental Impact Study Preliminary Report for the Cochiti Dam* (1973a), and from a literature search of mammals, birds, and fishes known to have inhabited the study area. Some of the species listed in the EIS report for the Cochiti area have been eliminated from discussion because of their negligible value to man as a food or fur-bearing source.

PREVIOUS RESEARCH

Little work has been done to delineate species within the three major life zones which occur in the study area. Most of the literature is very general when describing species which occupy these zones; data on specific number of species within each zone are unavailable. An attempt is made here to locate niches of the most economically important species within each zone (see Table II.4.1). It is important to remember that the Pajarito Plateau exhibits a greater diversity of speceis and environment than another locale in the United States, although the total number of individuals per species is low (Emlen 1974; U.S. Army Engineers 1973b).

Several intensive ethnographic and ethnozoological studies were made in the region at the turn of the century which provide valuable data on species availability at that time, as well as information about hunting practices employed during the 19th century. Bandelier (1892) and Henderson and Harrington (1914) worked in the Rito de los Frijoles region during this time period. From their own observations of Puebloan peoples and interviews with them, they concluded that deer, elk, mountain sheep, bear and wild turkey were hunted in the Pajarito region. However, they and others do not imply that vast herds of these animals were available in this region. Other late 19th and early 20th century visitors to the area recorded large flocks of grouse and turkeys during the fall season; up to 30 and 40 wild turkeys were sighted by Harrington (Henderson and Harrington 1914) at one watering hole.

ENVIRONMENTAL SETTING

Life Zones

Three major life zones, Upper Sonoran, Transition and Canadian have been defined for the study area. These zones have been described by numerous authors (Bailey 1913; Beck and Haase 1969; Merriam 1894). They will be discussed here briefly so as to identify the locations of the important mammalian, avian and aquatic populations. The source material for the following descriptions was derived primarily from Bailey (1913).

1. Upper Sonoran Zone

This zone falls in the middle and upper Rio Grande Valley of New Mexico. It is characterized as arid—average rainfall of 10 inches (250mm). The vegetation is sparse including desert shrubs, cactus, yuccas and short grasses. Grazing is good during some seasons. The higher edges of this zone are less arid and scattered with juniper, pinyon and better stands of grass. The elevation for the Upper Sonoran Zone ranges between 5000 to 7000 ft (1524 to 2134m) in the study area.

The animals which are characteristic of the Upper Sonoran Zone are small herbivorous rodents and reptiles. All animals in this area avoid high daily temperatures and become active in the early evening, early morning and night. The smaller mammals, such as mice and rats, are mostly nocturnal. Birds are active in the cool hours of the day, morning and early evening; they are quiet and conceal themselves during the day. Most mammals spend the day in the shade of rocks or trees; bird nests are found mostly on the east and northeast side of plants. Many animals in this zone go for long periods of time without water; they get enough water from succulent plant foods and the oxidation of fats and carbohydrates. Some mammals in the more desert areas of this zone tend to be lighter in color and smaller in size than those of the same species within more humid regions.

Large mammals, such as bison and pronghorn, are mostly absent from this environment. The most common mammals are raccoons *(Procyon lotor)*, black-footed ferret *(Mustela nigripes)*, spotted skunk *(Spilogale putorius)*, coyote *(Canis latrans)*, kit fox *(Vulpes macrotis)*, gray fox *(Urocyon cinereoargenteus)*, rock squirrel *(Citellus variegatus)*, white-tailed prairie dog

TABLE II.4.1

FAUNAL DISTRIBUTIONS BY LIFE ZONE

	UPPER SONORAN													TRANSITION										CANADIAN				
	Open Grassland	Forest	Pinyon	Juniper	Lakes/Streams	Desert	Canyon	Cliffs	Chaparral	Rim Rock	Prairie	Boulder Fields	Ubiquitous	Open Grassland	Pine Forest	Forest	Juniper	Lakes/Streams	Desert	Sagebrush Desert	Cliffs	Chaparral	Ubiquitous	Forest	Pine Forest	Chaparral	Rim Rock	Ubiquitous
RODENTIA																												
Prairie dog	+	+																										
Pocket gopher															+										+			
Rock squirrel							+	+				+																
Abert's squirrel															+													
Chipmunk																+				+					+			
Porcupine																+								+				
CARNIVORA																												
Spotted Skunk										+								+				+						
Black-footed ferret											+																	
Long-tailed weasel																							+					+
Mink																		+										
Otter																		+										
Raccoon					+													+										
Badger																			+			+						
Kit fox				+		+																						
Gray fox		+							+	+					+													
Coyote		+								+	+				+													
Black bear															+									+				
Grizzly bear															+													
Mountain lion															+						+							
Bobcat																										+	+	
ARTIODACTYLA																												
Elk															+											+		
Mule deer														+	+				+			+				+		
Pronghorn sheep	+																											
Bighorn sheep								+																				
LAGOMORPHA																												
Jackrabbit													+	+			+						+					
Cottontail rabbit													+	+									+					

(Cynomys gunnisoni), a variety of rats and mice, black-tailed jackrabbit *(Lepus californicus)*, desert cottontail rabbit *(Sylvilagus auduboni)*, pronghorn *(Antilocapra americana)* and mountain sheep *(Ovis canadensis)*. Mule deer *(Odocoileus hemionus)* are present in small numbers; the mountain lion *(Felis concolor)*, bobcat *(Lynx rufus)* and badger *(Taxidea taxus)* occasionally penetrate this region.

2. Transition Zone

This zone is located on the middle slopes of the Jemez Mountains, 7000 to 8500 ft (2134m - 2591m) on north-east slopes and 8000 to 9500 ft (2439m - 2896m) on the southwest slopes. The Transition Zone covers broad mesas, principle timber zones, open and grassy areas. It is characterized by a uniformity of climate and species.

The major mammalian population includes bat (numerous species), grizzly bear *(Ursus horriblis)*, raccoon *(Procyon lotor)*, long-tailed weasel *(Mustela frenata)*, mink *(Mustela vison)*, skunk *(Mephitas mephitus, Spüogale putorius)*, river otter *(Lutra canadensis)*, badger *(Taxidea taxas)*, coyote *(Canis latrans)*, gray wolf *(Canis lupus)*, mountain lion *(Felis concolor)*, bobcat *(Lynx rufus)*, black bear *(Urus americanus)*, beaver *(Castor canadensis)*, Abert's squirrel *(Sciurus aberti)* and other squirrels, least chipmunk *(Eutamias minimus)*, Botta's pocket gopher *(Thomomys bottae)*, a variety of rats and mice, porcupine *(Erethizon dorsatum)*, jackrabbit *(Lepus californicus)*, cottontail rabbit *(Sylvilagus auduboni)*, mule deer *(Odocoileus hemionus)* and elk *(Cervus canadensis)*. Table II.4.1 summarizes the distribution of species for the Transitional Zone.

3. **Canadian Zone**

This zone includes the higher parts of mountains, 8500 to 11,000 ft (2591m to 3354m) on cold slopes and up to 12,000 ft (3659m) on warm slopes. It is located in narrow and irregular strips, and is densely forested with spruce, balsam and aspens. It is the most humid zone in the study region and receives maximum rain and snowfall.

Species present include red fox (*Vulpes fulva*), lynx (*Lynx canadensis*), black bear (*Ursus americanus*), mice, chipmunk, porcupine, gopher, squirrel, weasel, marten (*Martes americana*), snowshoe hare (*Lepus americanus*), elk and mule deer. The distribution of species in the Canadian Zone by physiographic or ecological niche is summarized in Table II.4.1

MAMMALS

Since some of the mammals overlap in one or more life zones, they will be discussed as a unit by families. The reader is referred to Table II.4.1 in the previous section for differences in the distribution of mammals by life zones.

Artiodactyla

This class of animals is characterized as even-toed hoofed mammals; their weight is distributed equally on digits 3 and 4, with 2 or 4 toes on each foot, and are medium to large in size (Burt and Grossenheider 1964). Artiodactyla, found in the study area, include bison, bighorn sheep, mule deer, elk and pronghorn. The greatest percentage of mammal remains at archeological sites in the study area are represented by Artiodactyla, the mule deer probably being the most important (Harris 1968).

1. **Bison** *(Bison bison)*

The bison were found in the grasslands of the eastern plains of New Mexico in early historic times (Bailey 1931). Formerly, they migrated north in the spring and south in the fall. They are diurnal, gregatious and grazing animals which feed upon grasses but they do take some browse. They breed at 2 to 3 years of age from July through October; and normally have a single offspring at a time. The bison range in size from 1.5m to 2.0m in height, weighing from 363kg to 909kg. They are dark brown with a large head, high hump on the shoulder and have long shaggy hair on the shoulders and front legs (Burt and Grossenheider 1964).

Ethnographic accounts of the bison go as far back as 1540, when Coronado wrote that the Zuni Indians went to the Pecos region to hunt bison. This area was traditionally known to the Indians of New Mexico as a region of great bison herds. The Cochiti formerly went to the Pecos Valley to hunt bison; in the 1880's, they joined with the Santo Domingo and Tewa on such hunts (Lange 1968). Early observers recorded bison in other regions of New Mexico. For instance, Antonio de Espejo, in 1582, saw some bison near the village of Santo Domingo; in 1853, a Tewa informant reported that his father had killed two bison near Santo Domingo. The Cochiti also claimed to have hunted bison in the Estancia Valley (Lange 1959:130).

The actual range of the bison in New Mexico has been a disputed matter among zoologists and naturalists. Allen did not find evidence of bison in the New Mexico highlands west and south of Santa Fe (Bailey 1913). Palmer, however, found evidence of bison west of Fort Wingate in western New Mexico; his claim brought the bison's range to the latitude of Santa Fe. Most authors, however, use the Rio Grande as the western limit of the bison.

By 1859, bison were no longer present in New Mexico. Between 1870 and 1884, these animals were nearly exterminated over the rest of their range (Hornaday 1927); the 1889 census by Hornaday found only 256 captive and 285 wild bison in the United States. In 1914, the Tewa stated that they had never seen a live bison (Henderson and Harrington 1914:13).

A great deal of literature has been devoted to the description of bison hunts, therefore, a detailed description will not be given here. Bison, herd animals, were hunted with spears, bows and arrows, and firearms. Traditionally, they were hunted communally, the meat being divided by the participants according to prescribed rules. Surrounds and drives were methods used by the Indians, including Pueblo Indians, to kill these animals.

Bison were economically important. Not only did they provide the group with a great quantity of meat, but also with tough warm hides for clothing and robes. The horns were used by some as headdresses, the hoofs for rattles, and the bones provided raw material for tools.

2. **Bighorn Sheep** *(Ovis canadensis)*

These animals inhabited the rugged cliffs and crags of the San Juan and Jemez Mountains (Bailey 1913:16). They prefer extremely rocky areas with nearby grass and browse. In 1873, they were common in the mountains near Santa Fe (Bailey 1913). By 1927, the only reported sightings of this animal were in the Hatchet, San Andres and Guadalupe Mountains (Ligon 1927).

The bighorn sheep range in height from 0.9m to 1.1m. Males weigh between 57kg to 125kg, females 34kg to 68kg. They are brown to grayish brown with a creamy white rump and massive coiled horns (uncoiled in the female) (Burt and Grossenheider 1964).

Males and females usually separate during the summer; rams joining the ewes and lambs in the fall. They are gregarious animals. They may move to lower elevations in the winter. The primary causes for their migration are food shortage, better climatic conditions (always followed by a return journey) and gametic migrations for procreation. It is the only hoofed animal which provides itself with a "home" in caves to get out of the heat (Hamilton 1939).

They browse and graze on a wide variety of plants. The females breed at 2.5 years; rutting season is from November to December. The young are born from May to June above the timberline. Usually only a single offspring is produced at one time (Burt and Grossenheider 1964).

The number of bighorn sheep was reduced greatly and by 1926, there were only 200 in New Mexico (Hornaday 1927). They were not hunted intensively, but were nearly exterminated when domestic sheep were introduced; they were particularly vulnerable to the dis-

ease, eganthrax, which was brought in with domestic sheep (Hamilton 1939; Grinnel 1928). Bandelier (Henderson and Harrington 1914) recorded that he saw the last bighorn sheep at Rito de los Frijoles in 1880.

Hamilton (1939:362-63) indicated that the bighorn sheep were difficult to hunt because of their swiftness and habitat. However, Grinnell (1928:6) claims that, contrary to popular belief, they were easy to kill; he cited instances of cowboys roping them and dogs bringing them to bay on the open prairie. Since they habitually use the same trails, they were easy to kill; it was only necessary to conceal oneself beside the trail and wait for them to pass (as is true of elk, deer and pronghorn). Hamilton (1939) recorded the use of blinds by Pueblo Indians at the sides of such trails.

3. **Mule Deer** *(Odocoileus hemionus)*

Mule deer are found in the coniferous forests, desert shrub-land, chaparral and grasslands with shrubs; browse plants are necessary. These animals are most active in the morning, evening and moonlight nights. They feed mostly on shrubs and twigs, but do eat grass and herbs. They migrate to the mountains in the spring and down to the valleys in the fall (Seton 1929).

The mule deer range in height from 0.9m to 1.1m; males weigh 57kg to 182kg and females 45kg to 68kg. They are reddish in summer, blue-grey in winter; some have a whitish rump patch. The tail is either black-tipped or black on top. Young are born in June and July, usually two offspring at a time. They range from 36.5ha to over 243ha (Burt and Grossenheider 1964; Olin 1971).

Mule deer were probably the most important source of animal food for populations in the study area. Their numbers and their large size made them economically important.

Deer were hunted communally in historic times. The hides were used for blankets, leggings, shirts, moccasins and drum heads. Hoofs were used for rattles, and the horns for tools and ceremonial paraphernalia. Deer and other Artiodactyla were driven, encircled and killed. If any other game animals were surrounded during these hunts they also were taken by the hunters (Lange 1968). If a deer was killed by a lone hunter, he did not bring it back but went to the village to announce the kill and then returned to the kill site accompanied by one or more men to bring back the animal.

At archeological sites, mule deer probably represented the greatest percentage of Artiodactyla (Harris 1968).

4. **Pronghorn** *(Antilocapra americana)*

This speedy and gregarious animal inhabits open country below the woodlands. They summer in the high plains and winter in the valleys. Their migrations are local and irregular. The pronghorn are diurnal and sleep during the night on hill slopes. They are a grazing animal and, in the morning hours, are found feeding in the valleys. They live in small bands; in the fall they are found in pairs or small groups of 3, 4 or 5 (Skinner 1967).

They are approximately 1.0m tall, weigh between 34kg to 59kg. They are pale tan, distinguished by a large white rump patch, white lower sides and two broad bands which project forward. They have two toes on each foot. The young, usually two in number, are born in May. They range from 3kg to 6kg (Burt and Grossenheider 1964).

In 1889, there were still large numbers of wide ranging pronghorn (Bailey 1931). In 1886, a herd of 200 were sighted on the mesas west of the Rio Grande opposite the mouth of the Rio Hondo. In an interview conducted by Bailey (1886), the Indians said they had hunted the pronghorn with bow and arrows then firearms, for as long as they could remember. Between 1899 and 1918, a marked decrease in the herds was noted by the Bureau of Biological Survey. Skinner (1967) observed that by 1888 the herds in New Mexico were uncommon in "white" areas. By 1900, there were only 20,000 pronghorns in the state.

Pronghorns were hunted on the Pajarito Plateau, mostly near White Rock Canyon (Henderson and Harrington 1914:15). Lange (1968) reported a box canyon, just north of the mouth of White Rock Canyon, which was used to trap pronghorn and deer; they were impounded and slaughtered at this site. Pit traps were also reported east of Bland above Rio Chiquito; these sites were located on mesa tops where the animals were driven into a narrow trail with high steep walls on either side and then killed (Lange 1968:130). According to Skinner (1967), pronghorn are easy to kill because they are extremely curious, friendly and will come within close range.

5. **Elk** *(Cervus canadensis)*

Elk inhabit semi-open forest lands, mountain meadows, foothills, plains and valleys. They are active in the morning and evening. They can be seen in groups of 25 or more; both sexes winter together, but the bulls separate during the summer. They feed on grass, herbs, twigs and bark. They migrate to the mountains in the spring and to the valleys in the fall. The young are born from May to June, normally having a single offspring at a time.

Elk are large animals which weigh from 318kg to 456kg; they are 1.2m to 1.5m in height. Elk were not reported in the region in 1914; however, Bandelier reported the appearance of some at Rito de los Frijoles (Henderson and Harrington 1914).

As with deer and pronghorn, elk habitually used the same trails and were hunted by the use of blinds and drives. As other artiodactyla, they provided a quantity of protein, hides and raw materials for the Indians.

Lagomorpha

The Leporidae which are most common in the study area are the jackrabbit and the cottontail rabbit. Because of their numbers and ubiquitous distribution, they provide a steady supply of food and pelts for hunters. The two species which are utilized most frequently are *Lepus californicus* and *Sylvilagus auduboni*. Other species do occur in the study area though are rare in archeological sites. These include the whitetailed jackrabbit *(Lepus townsendi)*, the Rocky Mountain cottontail rabbit *(Sylvilagus nuttalli pinetis)*, and the Colorado cottontail rabbit *(Sylvilagus auduboni warreni)*.

1. **Jackrabbit** *(Lepus californicus)*

The jackrabbit is found in valleys of arid regions, open plains, foothills and low valleys. They are active from late afternoon and throughout the night. They seek

safety in thickets, and appear to be most abundant where there is least water. This species is not a burrowing animal; it lives and hides under bushes. The jackrabbit weighs 1.0kg more than the cottontail, from 1.3kg to 3.2kg; it is 43.2cm to 53.3cm head to rump. The animal is grayish-brown with large black-tipped ears and has a black streak on the tip of its tail. It bears offspring spring through fall.

2. **Cottontail** *(Sylvilagus auduboni)*

The cottontail is found in the grasslands and open areas, sparsely vegetated deserts and where there is grass, sagebrush and scattered pinyons and junipers. They depend on broken terrain, especially rock areas for cover. Altitude is not a barrier to these small mammals. They are found along canyon slopes parallel to arroyo bottoms. Cottontails are most active in the early evening through early morning; and they sit in clumps of grass or brush during the day. They are rarely seen in the winter from October to April. Their range is from 2.5ha to 6.0ha (Murie 1954).

The head and body measure 0.3m to 0.4m; and they weigh between 1.1kg and 1.6kg. The body is pale gray, washed with yellow. Their young are born throughout the year (Burt and Grossenheider 1964).

Lange (1959), Curtis (1926) and Goldfrank (1927) have mentioned communal rabbit hunts among the Cochiti Indians; Bandelier (1892) described rabbit hunts for the Cochiti in 1880. The major rabbit hunts occurred in the spring, before planting, and in the fall just before harvest. About 25 to 30 cottontail and jackrabbits were taken during these hunts. The large fall and spring hunts were directed by the war chief and were more ceremonial than those which occurred during other times of the year. Women and children could hunt rabbits at anytime, however, the war chief still directed them. During the ceremonial hunts (see Lange 1959), for complete description), villagers yelled and screamed; men rode horses; women, girls and boys ran on foot scaring rabbits out of hiding. When one appeared it was clubbed to death. Communal rabbit hunts were still observed among the Cochiti in 1920 and up to 1947 (Lange 1959:126).

Rabbits were utilized principally for meat; however, the fur also was used. Pelts were stripped and woven into blankets and the fur utilized for decoration of ceremonial items (Lange 1959:128).

Cottontail was, most likely, a staple food item. In Harris' study (1968), Lagomorphs made up one-third of the total fauna at LA 6462, a complex Pueblo II-Pueblo III site. They were plentiful, easy to kill and provided a buffer in lean times.

Rodentia

In the family Sciuridae, numerous species were utilized for food and fur: prairie dog, rock squirrel, Abert's squirrel, beaver, chipmunk, marmot, gopher and porcupine. This discussion will center upon the more important of these species in terms of man's usage.

1. **Prairie Dog** *(Cynomys gunnisoni)*

Gunnison's prairie dogs inhabit open grasslands and forest areas. They are found in the Jemez pine forests; Bailey (1931) collected specimens in the Jemez which weighed 43g. Their natural habitat is open areas where enemies can be sighted at a distance. They live in mountain valleys 5000 to 8500 ft (1534m to 2591m), open or slightly brushy country and scattered juniper and pine regions. They are less colonial than the blacktail prairie dog *(Cynomys ludovicianus)*.

This small mammal weighs from 68g to 91g. The terminal third of its tail is white. The body is yellowish in color and it is slightly smaller than the domestic cat. They hibernate from October or November to March in the north and in high mountain valleys. Bailey noted the use of the prairie dogs by modern New Mexico Navajos, and claimed they were easy to catch and were a good food source (Bailey 1931; Harris 1968).

2. **Rock Squirrel** *(Citellus variegatus)*

This small animal, which is good for food, is difficult to hunt. It inhabits rocky canyons and boulder-strewn cliffs. It is diurnal, not colonial and climbs nearly as well as tree squirrels. They feed on seeds, fruit, nuts, eggs and meat; they store food in their den. The den is usually beneath a boulder. If they hibernate, it is only for short periods. The young are born in April through August.

The rock squirrel is approximately 25cm long, weighing from 68g to 81g. Within its range, it is the largest of the ground-living squirrels. It is seen foraging in the open, or sitting on the top of a boulder. It was unlikely that this species was used as a regular food source, because it is hard to catch. They have been found in an archeological context (Harris 1968).

3. **Abert's Squirrel** *(Sciurus aberti)*

This squirrel is restricted to the Transition Zone, the yellow pine forests from 7000 to 8000 ft (1178m to 2216m). They are good eating; and feed primarily on pine cones, the cambium layer of small pine twigs and also fungi. They build nests high in the pines. The head and body measure 29cm to 30cm, and they weigh 43g to 57g. The tail is either completely white, or white beneath and broadly bordered with white. The belly is either white or black. They have predominant black or blackish ear tufts. According to Harrington, they were eaten by the Pueblo Indians (Henderson and Harrington 1914).

4. **Beaver** *(Castor canadensis)*

The beaver inhabits streams and lakes with trees on the banks. Appearing shortly after sundown, they are chiefly nocturnal, but are occasionally seen during the day. Their preferred food is aspen, poplar, birch, maple, willow and alder; they feed on bark and small twigs. The beaver live in groups of parents, yearlings and kits. They may burrow in river banks. The young are born from April through July. These animals are an important fur-bearing and food source.

They are 68cm to 76cm from the head to the base of the tail, and weigh from 14kg to 27kg. They are brown in color, their tail is naked and shaped like a paddle (Burt and Grossenheider 1964).

Carnivora

1. **Canidae**

The kit fox (*Vulpes macrotis*), gray fox (*Urocyon cinereoargenteus*), coyote or bush wolf (*Canis latrans*)

and timber wolf (*Canis lupus*) are found in the study area. These animals were not consumed by man, but were hunted extensively for their fur which was used for clothing, decorating ceremonial objects and also as a trade commodity. Gray fox skins were used as "pendant skins at the back of men's dance kilts" (Lange 1959). Foxes were communally hunted; however, it is now an individual endeavor.

2. Felidae

The mountain lion, also known as the puma, panther or cougar (*Felis concolor*), and the bobcat or bay lynx (*Lynx rufus*) were hunted for their pelts. Later, Spanish and Anglo populations hunted these animals as they were a threat to herds of sheep and cattle. According to the Cochiti (Lange 1959), the meat of the mountain lion was never eaten. To kill this animal was like killing a human enemy. The skin was brought back to the village and the body of the lion was buried by the hunter at the site of the kill. The skull was removed at the time of skinning.

3. Mustelidae

These animals were primarily hunted for their pelts and provided little or no food value to the Indians of the region. These mammals include: the spotted skunk, the long-tailed weasel, the marten, the mink, the black-footed ferret, the badger and the otter.

The skunk was communally hunted. Their pelts were used for anklets and for dance costumes. The hunting procedure was to block up one hole, the northernmost, and when the skunk's head appeared at the other, he was clubbed. Today hunters use traps (Lange 1959).

4. Ursidae

The grizzly bear and the black or cinnamon bear were prized as food and fur-bearing sources. Both specimens occupied mountainous regions; prior to the increase in human populations they were ubiquitous in the study area. The black bear is primarily a noctural animal, but occasionally may be seen during the day. They are solitary, except the female with cubs. They eat nuts, berries, tubers, insects and their larvae, small mammals, eggs, honey, carrion and garbage. They den beneath downed trees, in hollow logs, beneath roots or any place where there is shelter. Ursus semihibernate during winter in the northern part of their range. They weigh between 90kg to 215kg for the black bear, and 145kg to 385kg for the grizzly. Males range 25km or more, females less; they can run up to 55kph for short distances. Their sight is poor, hearing moderate and their smell is good. They may live 30 years or more. The young are born in the winter den during January or February; normally there are two offspring which are weaned in August.

The grizzly bear prefers twilight hours, but may be seen at any time of the day. They are solitary, or found in small family groups. Their diet is similar to the black bear. They may dig a den on a slope; and they habitually re-use the trails, stepping in the same footprints. They mate from May through July; the young are born in January.

Both bears were prized as a source of food and fur. Bear bones were never thrown into the yard or corrals as were sheep or cattle bones; they were thrown into the river or taken to shrines (Lange 1959). Bear, lion and eagle skulls were buried under rocks as offerings. To kill a bear was akin to killing an enemy and a great deal of ceremony surrounded its death.

3. Procyonidae

The raccoon or ring-tailed coon (*Procyon lotor*) was hunted as a food and fur-bearing source. They are found along those streams where there are wooded areas or rock cliffs nearby. They are nocturnal, feeding mostly along streams and lakes. They are omnivorous. Racoons den in hollow trees, logs, rock crevices or ground burrows during cold spells in the north; they do not hibernate. Burt and Grossenheider (1964) record a density ranging from 1 per 0.4ha to 6.0ha. They mate in February through March; the young are born in April or May with an average of four offspring at a time. These animals weigh from 5kg to 16kg and reach a body length of 71cm. The body is a black and white mix with a black mask over the eyes and alternating rings of yellowish white and black on their tail.

Raccoons were hunted for their pelts (Lange 1959); however, their remains are seldom found in the archeological context.

Table II.4.2 shows the population dynamics of the important food and fur species during each season of the year. Table II.4.3 shows the activity periods during the 24-hour cycle for each species; this is correlated with the seasons of the year.

TABLE II.4.2

POPULATION DYNAMICS FOR MAMMALS

	FALL	WINTER	SPRING	SUMMER
Beaver	s	s	s	s
Squirrel	s	s	s	s
Prairie dog	colony	colony	colony	colony
Chipmunk	s	s	s	s
Gopher	s	s	s	s
Porcupine	n.d.	s.g.	n.d.	s
Gray fox	s	s	s	s
Coyote	s/s.g.	s/s.g.	s/s.g.	s/s.g.
Wolf	greg.	s	s	greg.
Mt. lion	s	s	s	s
Bobcat	s	s	s	s
Raccoon	s	s	s	s
Skunk	s	s.g.	s	s
Weasel	s	s	s	s
Marten	s	s	s	s
Ferret	s	s	s	s
Badger	s	s	s	s
Otter	greg.	greg.	greg.	greg.
Black bear	s	s	s	s
Grizzly bear	s	s	s	s
Elk	s	s.g.	s	s
Pronghorn	greg./pairs	greg./pairs	s.g.	s.g.
Mule deer	herd	s.g.	s.g.	herd
Bison	greg./herd	greg./herd	greg./herd	greg./herd
Bighorn	greg./herd	greg./herd	greg./herd	greg./herd
Cottontail	n.d.	n.d.	n.d.	n.d.
Jackrabbit	n.d.	n.d.	n.d.	n.d.

s = solitary
greg. = gregarious
s.g. = small groups
n.d. = no data

TABLE II.4.3

MAMMALS: PERIODS OF MOST ACTIVITY

	Diurnal	Nocturnal	EM	A	EE	N
Black bear*		+				
Grizzly bear*					+	+
Raccoon		+				
Weasel		+				
Skunk		+				
Marten		+				
Mink		+				
Ferret		+				
Badger		+	+	+		
Otter			+	+		
Kit fox		+				
Gray fox		+				
Coyote		+				
Wolf		+				
Mt. lion		+				
Bobcat		+				
Rock squirrel*			+	+	+	
Abert's squirrel*			+	+	+	
Chipmunk	+					
Prairie dog*	+					
Gopher	+	+				
Porcupine		+				
Cottontail			+		+	+
Jackrabbit			+		+	+
Beaver		+				
Bison	+					
Bighorn	+					
Mule deer			+		+	+
Pronghorn	+					
Elk			+		+	

* hybernating animals

Early Evening = EE

Night = N

Early Morning = EM

Afternoon = A

AVES

Discussion of the avifauna will focus on those members which are important food species. Although many songbirds and birds of prey inhabit the region, they will not be discussed here because of their negligible value as an economic resource. A partial list of all birds, which are known to the study area in an archeological context, may be found in Harris (1968:198ff).

The avifauna to be discussed include species from the orders of Anseriformes, Gruiformes, Columbiformes, Falconiformes and Strigiformes. Many of these species are regular migrants through the Rio Grande flyway and can be found in great numbers within this region during both spring and fall.

Anseriformes and Gruiformes provide an ample quantity of meat during the fall and spring migrations. The Galliformes apparently were abundant in the region; the turkey (*Meleagris gallopave*) especially was used for meat, feathers and eggs. Hawks, owls and eagles were prized for their feathers which were used as ceremonial paraphernalia.

Anseriformes

This order includes *Anserinae, Anatinae, Aythyinea, Oxyurinae and Merganie* (geese, swans and ducks). The following species are to be found seasonally in the study area. They are aquatic birds with webs between their three front toes; they have long necks and narrow pointed wings. Most birds in this order have short legs and are heavily insulated with down feathers (Robbins *et al.* 1966; Peterson 1941).

The following families occur throughout the study area:

1. Anserinae

Canada goose (*Branta canadensis*) and snow goose (*Chen hyperobrea*) migrate through the Rio Grande Valley; they winter on the river near Albuquerque and south of this city. Canadian geese only gather in large flocks during the breeding season and graze in fields which are close to water; they migrate by day and night. Snow geese also fly in large flocks.

2. Anatinae

These are surface-feeding ducks, chiefly vegetarians, but are known to eat insects, mollusks and small fish. Species which are important to the study area include: the mallard (*Anas platyrhynchos*), Mexican duck (*Anas diazi*), pintail (*Anas acuta*), gadwall (*Anas strepera*), American widgeon (*Mareca americana*), shoveller (*Spatula clypeata*), blue-winged teal (*Anas discors*), cinnamon teal (*Anas cyanoptera*) and green-winged teal (*Anas carolinensis*).

3. Aythyinae

These are "bay ducks," a heavy bird which eats more animal food than the surface-feeding ducks. Species include the redhead (*Aytnya americana*), canvasback (*Aytha valisineria*), ring-necked duck (*Aythya collaris*), greater scaup (*Aythya marila*), lesser scaup (*Aythya affinis*), common golden-eye (*Glaucionetta clanguia*) and bufflehead (*Glaucionetta albeola*).

4. Oxyurinae

The only species in the study area is the ruddy duck (*Oxyura jamaicensis*) which is a small bird. They are common during summer on ponds with floating vegetation, and during the winter on estuaries, lakes and rivers.

5. Merginae

The common merganser (*Mergus merganser*) is a fish-eating bird and is a fresh water species.

Gruiformes

This order includes the whooping crane and the sandhill crane; both are wading birds with long legs and heavy-bodied. The sandhill crane migrates in early October; the spring migration terminates in early March.

1. Gruidae

The sandhill crane (*Grus canadensis*) habituates prai-

ries, fields, marshes and open pine lands; they can be seen in large flocks. They subsist on small rodents, frogs and insects. The whooping crane (*Grus americana*) is also present in the study area.

Galliformes

Birds of this order are heavy-bodied, chicken-like land birds. When flushed, they seldom fly more than a few hundred feet. All are able runners and forage on the ground for seeds and insects. They are primarily a non-migratory bird. The following families of Galliformes were important food sources for populations in the area.

1. Meleagrididae

The turkey (*Meleagris gallopavo*) bred in considerable numbers in the mountains. Harrington and Henderson (1914) saw a flock of 30 near Valle Grande just beyond the headwaters of El Rito de los Frijoles. In autumn, they came down into the canyons in large numbers and congregated around springs (Henderson and Harrington 1914:35). Wild turkeys occur in the Jemez Mountains today. The turkey was most common, after the cottontail, at archeological sites which were analyzed by Harris (1968:198). Harris believes that the number of recovered turkey bones indicates a domestic animal. Because several of the specimens showed healed broken bones, he suggests that they were unlikely to have been wild since predators certainly would have killed these birds. Numerous turkey shells also were retrieved which indicates utilization of turkey eggs as a food source (Harris 1968).

2. Phasianidae

The scaled quail (*Callipepla*) and Gambel's quail (*Lophortyx gambelii*) are common in dry areas. Large flocks of scaled quail were seen in Rito de los Frijoles in the late 1800's (Henderson and Harrington 1914:33). This bird occupies the dry-semi-desert country, and is found in flocks of up to 100 birds. They seldom fly, but prefer to run.

3. Tetraonidae

The Dusky Grouse (*Dendragapus obscurus*) was common in the Jemez Mountains and came down in large numbers into Frijoles Canyon during autumn (Henderson and Harrington 1914:34).

Columbiformes

Columbidae are small birds which eat grains, small seeds, acorns and fruit. They nest generally in trees. The western mourning dove (*Zenaidura macroura*) is the most common dove in the region. The only other dove in New Mexico is the band-tailed pigeon (*Columba fasciata*); its nest is solitary yet the bird feeds in flocks. They were abundant in canyons and mesas, and were utilized by the Indians as a food source (Henderson and Harrington 1914:36).

Falconiformes

The eagle and hawk were used by the Puebloan Indians for their feathers rather than for meat. Falconiformes are diurnal flesh eaters; most take live prey, but some are scavengers.

1. Accipitrinae

The sub-family Buteos includes the red-tailed hawks (*Buteo jamaicensis*), Swainson's hawks (*Buteo swainsoni*) and rough-legged hawks (*Buteo lagopus*) which inhabit the region.

Golden eagles (*Aquila chrysaetos*) are found in the mountains and deserts; they feed on rodents. The golden eagle was of special significance to the Pueblo peoples; its feathers were used for ceremonial purposes. If a hunter killed one of these birds, it was the same as killing an enemy among the Cochiti. The meat was never eaten; the head and skin of the birds were returned to the pueblo by the hunter. The eagle feathers were used in making the mask of Ka'tsina, the Turkey Vulture (Lange 1968). The eagle head was placed with cornmeal and bread under a rock in a canyon about one mile north of the pueblo.

There is no ethnographic evidence that the Cochiti trapped eagles as did the Jemez and Pecos (Bandelier 1892; Parsons 1919). Present day Cochiti informants, however, mention that they do trap eagles (Lange 1959).

The bald eagle (*Halideetus leucocephalus*) was sighted at Rito de los Frijoles by Harrington (1914). This bird was utilized by the Puebloan peoples in much the same way as the golden eagle.

Strigiformes

In the study area, the great horned owl (*Bubo virginianus*) was often killed for its feathers. They are mostly nocturnal in their behavior and are best seen at dusk.

FISH

Fishing, as an economic activity, was apparently unimportant among the populations in the study area. Few references were found to fishing in the Rio Grande or other bodies of water in the study area. According to Bandelier (1892), seining became extinct among the Cochiti by 1882. Bailey (1931:228) refers to Indians in the area catching fish in pools, after the spring runoff and after short-term rises in the river. Henderson and Harrington (1914) explained the lack of emphasis upon fishing by the Puebloan peoples of the region, because many species of fish were unable to survive in the waters of the Rio Grande. Small streams occur in the side-canyons, but they are dry most of the year; therefore, they cannot supply a steady or sufficient amount of water to provide a suitable habitat for aquatic species. Due to the lack of rain, the runoff is not enough to provide deep pools to sustain fish during dry periods. Current explanations for the lack of fish in the study area are the irrigation diversion system, high water temperatures and periods without water. Also, the shifting sandy bed, fluctuating flows and the turbidity of the river do not supply the proper environment, as well as the absence of sufficient aquatic plant life to sustain any numbers of fish (U.S. Army Corps of Engineers 1973).

There are, however, a number of native fish still surviving in the Rio Grande waters in the study area. A list of these species was obtained from Hubbs (1972) and Hatch (personal communication). The U.S. Army Engineers *Environmental Impact Statement for Cochiti Dam* (1973) also lists introduced species. A brief description of the native species is given below with their food sources, habits and weights (Hubbs 1972; Koster 1957).

Some fish bones have been found archeologically in the study area. Their numbers are few, but it is impor-

tant to remember that fish bones do not preserve well; a true estimate of their value to prehistoric and protohistoric peoples is not indicated at any of these sites.

1. **Sturgeon Family (Acipenseidae)**

The shovelnose sturgeon (*Scaphirhynchus platorynchus*) was a native fish of the Rio Grande. Now extinct, the last specimen recorded for the Rio Grande was in 1874. This species grew to over 45kg.

2. **Gar Family (Lepisosteidae)**

Fish of this family spawn in the late spring. They feed almost exclusively on other fish. One species which is common in the study area, the longnose gar (*Lepisosteus osseus*), reaches a length of 0.6m to 1.0m and weighs up to 3kg.

3. **Salmon Family (Salmonidae)**

When small, they feed on insects and other small animals: later, they eat larger organisms including other fish. The cutthroat trout (*Salmo clarkii*) is native to the study area. They weigh up to 1.0kg.

4. **Sucker Family (Catostomidae)**

These fish are bottom dwellers. They feed upon larva and adult aquatic insects, worms and algae; they spawn in the spring. Suckers provide a suitable amount of food and are potentially a valuable food resource. Those found in the study area include the blue sucker (*Cycleptus elongatus*), weighing approximately 1.3kg, the smallmouth buffalo fish (*Ictiobus bubalus*), from 2kg to 7kg, the gray redhorse (*Moxostoma congestum*) and the Rio Grande sucker (*Catostomus plebeius*).

5. **Minnow Family (Cyprinidae)**

Minnows, similar to suckers, are diverse in their habits and habitat selection. Some feed on the bottom, others are carnivorous, some herbivorous and some omnivorous. They spawn in late spring or summer. Species in the study area include the Rio Grande chub (*Gila nigrescens*), up to 25cm in length and less than 50g, the Rio Grande shiner (*Notropis jemezanus*), 7cm to 10cm in length, the bluntnose shiner (*Notropis simus*), from 7cm to 10cm long, and the roundnose minnow (*Dionda episcopa*), less than 7cm in length.

6. **Catfish Family (Ictaluridae)**

Catfish are nocturnal, omnivorous and bottom feeding. The flathead catfish (*Pylodictis olivaris*), weighing from 9kg to 14kg, is the only species which is native to the area.

7. **Live-Bearer Family (Poeciliidae)**

Members of this family bear their young alive. Only one species is native to the area, the Pecos gambusia (*Gambusia nobilis*). This fish ranges from 2cm to 4cm in length, and weighs less than 30g.

8. **Sunfish Family (Centrarchidae)**

These are nest builders; they are also bottom dwellers. Three species are native to the study area: the warmouth (*Chaenobryttus gulosus*), up to 25cm long and 2kg, the longear sunfish (*Lepomis megalotis*), up to 25cm long and 2kg, the longear sunfish (*Lepomis megalotis*), up to 15.2cm long and up to 1.0kg, and the rock bass (*Ambloplites rupestris*), less than 25cm long and up to 1.0kg.

USABLE MEAT

An attempt is made here to give a general index of consumable versus live weights of the important food species in the study area. The percentage of usable meat from mammals was derived from White's work (1953). His figures are based on modern day estimates of edible poundage of meat slaughtered and butchered in packing houses. Figures for the major mammalian food species in the Cochiti area are summarized in Table II.4.4.

TABLE II.4.4

LIVE VERSUS EDIBLE WEIGHTS FOR MAMMALS

	Average Live Weight	Estimated Edible Weight
Bison	816.0kg	408.0kg
Bighorn Sheep	272.0kg	136.0kg
Mule deer	91.0kg	45.0kg
Pronghorn	50.0kg	25.0kg
Elk	318.0kg	159.0kg
Cottontail	1.6kg	.8kg
Jackrabbit	2.7kg	1.4kg
Prairie Dog	.9kg	.8kg
Rock Squirrel	.7kg	.5kg
Grizzly Bear	295.0kg	206.0kg
Black Bear	136.0kg	95.0kg

TABLE II.4.5

LIVE VERSUS CONSUMPTABLE WEIGHTS FOR GALLIFORMES, ANSERIFORMES AND GRUIFORMES

	Average Live Weight*	Estimated Edible Weight
Turkey	5.4kg	3.6kg
Gambel's Quail	.2kg	.2kg
Scaled Quail	.2kg	.2kg
Canada Goose	4.0kg	2.7kg
Snow Goose	2.7kg	1.8kg
Mallard	1.1kg	.8kg
Gadwall	.9kg	.6kg
Pintail	.9kg	.6kg
Ringnecked Duck	.8kg	.5kg
Green Winged Teal	.3kg	.2kg
Blue Winged Teal	.4kg	.3kg
Cinnamon Teal	.3kg	.2kg
Widgeon	.7kg	.4kg
Shoveler	.6kg	.4kg
Redhead	1.1kg	.8kg
Canvasback	1.4kg	.9kg
Greater Scaup	.9kg	.6kg
Lesser Scaup	.8kg	.6kg
Goldeneye	.9kg	.6kg
Bufflehead	.5kg	.3kg
Merganser	1.4kg	.9kg
Mexican Duck	1.1kg	.8kg
Ruddy Duck	.5kg	.4kg
Whooping Crane	4.5kg	2.9kg
Sandhill Crane	4.5kg	2.9kg

(*Average weights were taken from Pough 1951)

Weight tables for the avafauna were derived in part from data gathered by John M. Campbell (personal

communication, J. McDowell (personal communication) and Theodore White (1953).

Campbell gives a general rule for determining edible weights for Anseriformes and Gruiformes: when plucked, head, feet, legs, and entrails removed, there will be slightly more than one-third weight loss. This figure, however, is based on the assumption that the entrails are not eaten. A slightly higher figure can be expected if the entrails are being consumed. For Galliformes, the total weight is found in the breast and legs (McDowell personal communication). A 10kg turkey will yield 8.5kg of edible meat. One important factor to consider when dealing with avian populations is that their bones are light: a 10kg turkey will yield more usable meat than a 10kg beaver because of the great weight difference in their bony structure. Table II.4.5 gives live weights for Galliformes, Anseriformes and Gruiformes with an estimate of their consumptable weight.

SUMMARY AND CONCLUSIONS

Henderson and Harrington (1914) and Harris (1968) noted that mammalian populations in the Cochiti area were sparse during historic and modern times. Since changes in faunal make-up usually progress slowly, it is probable that the present faunal densities and distributions reflect, in general, faunal populations that inhabited the area hundreds of years ago. Although it is possible that species in addition to elk and mountain sheep have disappeared from the Cochiti area, and that some species may have extended their range into this area, it is unlikely that these changes were significant enough to alter the structure of faunal populations in the Cochiti vicinity. Thus, the faunal information presented in this report should provide a basis for understanding man's past utilization of faunal resources in the Cochiti area.

While conclusive statements about different procurement strategies employed in the study area cannot be made, some historic and ethnographic information about faunal procurement are informative. Bandelier (1892) concluded that during the Anasazi times wild game was not the chief source of sustenance. He based this conclusion on the fact that the overall faunal density for the Cochiti area was low in relation to the high number of Pueblo peoples. He further suggested that although rabbits, squirrels and other game were used as food supplements, they did not represent a large percentage of the Anasazi diet.

Ethnographic documentation suggests that man hunted communally, usually banding together when species counts were high, for instance during fall or spring migrations of the Artiodactyla. They also joined together when their primary subsistence food was scarce e.g., just before spring planting and just before fall harvesting. Until the use of firearms became a way of life for the Cochiti, deer pronghorn, bison, elk, mountain sheep, rabbits, small rodents and quail were communally hunted (Lange 1959); Dumarest 1919). With the absence of big game, communal hunting decreased. According to Lange (1959) hunting now has nearly ceased for the Cochiti. All ethnographic evidence indicated communal rather than individual hunting practices for the Puebloan peoples in this area. Not only were large game hunted in this way but rabbits, squirrels and skunks were hunted communially. This insured a greater quantity of food for energy expended by the community.

The charts presented in the usable meat section provide some insight into the question of which animals were more economical to procure. The large Artiodactyla have the potential to provide great quantities of usable meat although the proportion of edible meat of the rabbit is higher. The larger the animal, the more entropy involved (Binford personal communication). Therefore, it is more economical to utilize the smaller species, such as squirrels and rabbits, on a continuous basis. Percentages of species found at archeological sites tend to support this hypothesis (Harris 1968). The availability of small game is a constant in the study area. Women and children, at all times of the year, hunted these species. Also, the whole community, men, women and children engaged in communal hunts of rabbits at specified times of the year.

Avian populations of ducks and other water birds were seasonally hunted and constituted the only really important food birds of the region. The Rio Grande is a major flyway for these species and can be hunted in great numbers during the fall and spring of the year. The Galliformes inhabited the region throughout the year and acted as a steady source of protein. It is likely that the Puebloan peoples domesticated the turkey as the number of bones and egg shells found in archeological sites indicates a constant use of these birds (Harris 1968).

Although fishing was not emphasized among the peoples of the study area, when utilized, they provided nearly one hundred percent usable meat. Unfortunately, fish bones do not lend themselves to preservation at archeological sites due to the friability of their bones. Consequently, an accurate accounting of their economic value cannot be estimated.

Some research possibilities for archeological interpretations of faunal remains include: (1) a need to look at faunal remains in terms of age of individual species. This information can be used to determine season of kill e.g., young and/or juvenile would, among Artiodactyla, indicate a spring kill; (2) total numbers of individual species could give us data on type of kill. Great numbers of the same species may indicate communal hunts. Also, this could tell us about seasonal kills and the utilization of aggregating species.

II.5
An Agricultural Stratification of the Cochiti Study Area

E. ANN RAMAGE

INTRODUCTION

One objective of archeological analysis is that of gaining an understanding of processes underlying the ways in which human populations adapt to environmental variability. Analysis directed toward this goal necessitates formulation of techniques to stratify environmental variability in a manner relevant for isolating relationships among such variability and past human adaptive behavior.

One prehistoric adaptive system in the study area, the Anasazi, was economically dependent, in large part, upon the agricultural production of maize, beans and squash. In order to gain an understanding about the strategy of Anasazi land utilization, it is necessary to stratify the study area according to criteria informative about its agricultural productivity.

Environmental descriptions of modern vegetative communities which are oriented toward definition of the paleoenvironmental structure of a region, while extremely useful in formulation of models concerning procurement of nonagricultural resources, provide little insight into the potential agricultural productivity of a region.

The purpose of this paper is to present a method for stratifying the study area into measurable agricultural land classes. Once the study area has been so stratified, hypotheses may be generated concerning prehistoric utilization of the environment with respect to agricultural land classes rather than biotic communities.

VARIABLES AFFECTING AGRICULTURAL POTENTIAL

The first step in stratifying an area into arable land classes involves a delineation of variability affecting agricultural productivity. Climate, soil type, slope, exposure and erosion have been proposed as relevant variables in this respect. In order to evaluate the utility of these variables for creating measurable land classes as well as their suitability for a nonmechanized agricultural economy, various soil conservation, agricultural and archeological literature were consulted.

Soil Conservation Service Land Capability Classes

The Soil Conservation Service (SCS) has developed a series of land capability classes. According to Hudson (1971:147-148), the purpose of these classes is "to permit decisions as to the combination of agricultural use and conservation measures which allow the most intensive agricultural use of the land without risk of soil erosion." These capability classes are an "interpretative classification based on the effects of combinations of climate and permanent soil characteristics on risks of soil damage, limitations in use, productive capacity and soil management requirements" (Klingebiel and Montgomery 1961:4). Permanent soil characteristics include slope, soil texture, soil depth, effects of past erosion, permeability, water-holding capacity and type of clay minerals present in the soil (Klingebiel and Montgomery 1961:4).

These capability units do not indicate which soil type is best suited for a particular crop since the capability classes do not monitor the fertility or productivity of the soil, but rather those characteristics which influence its erodibility (Hudson 1971:151). Class II land, which requires greater conservation measures than Class I land, may produce higher yields of particular crops than Class I land (Hudson 1971:151). The land capability classes indicate primarily the conservation measures necessary for continued agriculture, not the productivity of the land. Nevertheless, the SCS capability classes have an agricultural referent. Of the seven capability classes used by the SCS, only four are considered suitable for agriculture.

Several factors preclude using SCS criteria as the basis of the agricultural classes for this study. First, the available general soil studies (which are reviewed in the next section) indicate which soil types are in the area but not the *specific location* of each soil type. The detailed soil survey which would have been necessary to apply SCS soil criteria exist for only one of the three counties in which the study area lies. The determination of many of the characteristics of the soil used in the SCS classification requires specialized knowledge of soils and field work, which was not available for this study.

Another important factor in not employing the SCS classification is that suitability of land for agriculture is determined not only by characteristics of the land but also by the technology employed in the cultivation of that land (Cordell 1972). SCS criteria for determining agricultural capability classes, are based upon mechanized farming techniques and are, not entirely applicable to the Anasazi who were nonmechanized farmers. Their farming implements and techniques were technically simple yet effective (Woodbury 1961:xiii). Farming tools attributed to the Anasazi include wooden digging sticks and stone or buffalo scapula hoes (Woodbury 1961:8; 1963:62).

Farming in the arid Southwest necessitates the use of irrigation, dry farming techniques or flood water farming techniques to compensate for the infrequent and unpredictable nature of rainfall. The Anasazi frequently used a variety of these techniques simultaneously to insure that the total crop for a year was not lost (Woodbury 1961; Hack 1942). Techniques for utilization of runoff include placement of fields in the mouth of an arroyo or on low flood terraces of large arroyos (Hack 1942). Check dams and terraces were also constructed in order to utilize runoff (Woodbury 1961; 1963). Anasazi fields were often

small, scattered plots several kilometers from the village resulting from the necessity of placing the fields in areas which captures runoff. Although the fields were small, their placement insured that they would be better watered than surrounding areas (Woodbury 1963:64).

Since the Anasazi were nonmechanized farmers, the SCS capability classes which are designed for large mechanized farms would not be entirely suitable for the present stratification. Some of the land in the study area has a limited suitability for modern farming because of its tendency to occur in small isolated patches. From the above description of Anasazi farming methods, the patchiness of the good capability classes would not be a serious limiting factor in the consideration of the agricultural potential of an area.

Soils

Although the soil data of the SCS do not form the basis of this study, a summary of the soil types found in the Cochiti area is presented here to show the general agricultural potential of the area as classified today. The soil types and the location of the soils are based on the general soil maps of Santa Fe, Los Alamos and Sandoval counties.

The Pajarito Plateau is characterized by the mountain soils forming in igneous materials. As the name implies, these unnamed soils have their origin in volcanic materials. The few soils of this association considered as having irrigation potential are in small, scattered areas (Maker *et al* 1971a:19).

The Apache Silver-Rockland Association characterizes White Rock Canyon. These soils are also forming in materials of volcanic origin (Maker *et al* 1971a:19). The soils of this association are considered to have a very limited irrigation potential with the better soils located in patchy areas on mesa tops (Maker *et al* 1971a:19).

The area below the Pajarito Plateau is characterized by the Rough Broken Land-Embudo Association. These soils which have their origin in gravelly, old alluvium are not considered to have any irrigation potential (Maker *et al* 1971a:13).

Land near the Rio Grande below the mouth of White Rock Canyon is characterized by the Gila-Vinton-Glendale Association. These soils, which form in alluvium, are considered to be suitable for farming (Maker *et al* 1971a:8-9). In fact, this area is presently under cultivation.

The Cerros del Rio is characterized by several soil associations. The largest component of this area is the Majada-Calabasas-Apache Association. The soils of this association have their origin in volcanic materials (Maker *et al* 1971b:17). Like the Apache-Silver-Rockland Association, these soils have little irrigation potential with the better soils located on the mesa tops (Maker *et al* 1971b:17).

The other associations encompass relatively small, scattered areas within the Cerros del Rio. Included among these associations is the Pojoaque-Rough Broken Land Association located in the northeast corner of the study area. These soils which are forming in old alluvium are not considered suitable for agriculture (Maker *et al* 1971b:12-13). The Panky-Pojoaque-Harvey Association located both in the southeast and southwest portion of the Cerros del Rio consists of soils forming in alluvium (Maker *et al* 1971b:14). These soils are considered to be well suited to farming (Maker *et al* 1971b:14). The Travessilla-Rockland-Bernal Association consists of a small area in the southern part of the Cerros del Rio. The soils of this group are forming in materials of sandstone origin and have a very limited irrigation potential (Maker *et al* 1971b:19). The El Rancho-Fruitland Association consists of soils developing in alluvium and are suitable for agriculture (Maker *et al* 1971b:11). This association is found in a small area on the eastern edge of the Cerros del Rio.

As would be expected from the limited irrigation potential of the majority of the soils, most of the study area including the Pajarito Plateau and the Cerros del Rio is characterized by SCS land capability Class 6, one of the classes not considered suitable for agriculture. Only along the Rio Grande below the mouth of White Rock Canyon and along the Santa Fe River drainage are a greater percentage of the soils classified in land capability classes considered farmable (Maker *et al* 1971a; 1971b).

Slope

Slope, which has been defined as the rate of ascent or descent along a specified line (Schwab *et al* 1952:243), is an important variable in agriculture for the degree of slope determines the amount of soil buildup. According to Weaver (1938:215) it is only on level ground and gentle slopes that sufficient soil can accumulate.

The amount of energy in the form of labor which must be invested into the land before it can be cultivated is in part determined by its slope. Larson and Teller (1945:44-45) state that not only does slope influence the kind of farming methods employed, but that it is cheaper to farm flat land than hilly land. Although they were speaking in terms of modern farming techniques, this statement seems applicable to premechanized farming techniques. As Duley and Coyle (1955:408) state the "slope of a piece of land should be given full consideration in deciding whether it is suitable for longtime cultivation."

Slope is one of the permanent soil characteristics used to determine land capability classes for a number of different classifications. The range of slope for each of the arable land capability classes is not a fixed unit but varies according to the social and economic conditions of the country. With increased population pressure and limited amounts of land, the slope of land considered arable increases (Hudson 1971). This trend is reflected by the land capability classification of Israel. Israeli Class I land has a maximum slope of 2%, Class II 6%, Class III 15%, and Class IV 35% (Hudson 1971:175). The range of slopes for the United States land capability classes does not seem to be a fixed unit but to vary with the study. For the sake of comparison with the Israeli data, the slopes for land classes found in Maker *et al* (1971a:4) will be presented here. The maximum slope for Class I is 3%, Class I 5%, Class III 9%, Class IV 20%. Since slope can be measured on topographic maps, its value as an agricultural-related variable for this study is greatly increased.

Erosion

The amount of erosion in the area, a factor influencing agricultural potential, is difficult to monitor on topo-

graphic maps. However, the amount of erosion is influenced by the degree of slope (Roberts 1955:24; Weaver and Clements 1938:215) with the higher slopes, when cultivated, being more susceptible to erosion (Larson and Teller 1945:45). Thus, erosion can be indirectly monitored through slope.

Climate

Two components of climate, another variable affecting agriculture, are temperature and rainfall. Temperature is an important consideration for agriculture since it controls the length of the growing season. The frost-free period of the study area ranges from 140-180 days (Tuan *et al* 1969:Fig. 38). However, this is not an accurate measure of the growing season since crops such as corn require a minimum temperature of 50 degrees F (10 degrees C) to germinate (Chang 1968:77; Jenkins 1941:310). Rain or the lack of it affects almost every physiological processes of plants (Chang 1968:118). Since each crop requires a minimum amount of moisture, rain therefore becomes a limiting factor in the choice of crops for a particular area.

These two components of climate are often monitored as average annual temperature and rainfall, although these averages are often not indicative of microenvironments within an area, especially the Cochiti study area in which there are no long term weather recording stations with the exception of Bandelier National Monument. Average annual measurements are thus interpolated from the scanty existing data (Tuan *et al* 1969).

The average annual temperature is a measure of the ambient air temperature while crops are more directly affected by the soil temperature (Chang 1968:88). As important as the amount of average annual rain is its seasonal distribution (Larson and Teller 1945:47). The study area is characterized by summer dominant rains of short duration. Available moisture may also be conditioned by the size and placement of drainage basins (see Brakenridge Section II, Chapter 6).

Exposure

Exposure, one of the attributes affecting the agricultural suitability of an area, is an indirect measure of climate. The soil temperature which is often of more importance to the crops than the air temperature is directly affected by exposure. The temperature differences between northern and southern exposures are fairly large ranging from 5-20 degrees C (Bennet *et al* 1972:633; Cottle 1932:132; Volobuev 1963:83). One of the few studies which deals with the differences between east and west slopes indicates that there is only a slight temperature difference (0.1-1.5 degrees C) between east and west exposures (Volobuev 1963:81). An example of the way in which exposure influences crop growth can be found in Weaver and Clements (1938:220) who state that "soils warm more quickly, vegetation starts earlier, and crops like wheat may ripen several days earlier on the south than on the north exposures."

The moisture content of the soil is also affected by its exposure. Several studies have shown that slopes with northern exposures have a much higher moisture content than southern slopes (Bennett *et al* 1972:633; Cottle 1932:129; Woodbury 1961:35; Cordell 1972). One of the critical periods during the growing cycle of corn for moisture occurs during the June dry season (Hack 1942: 22). Thus under hot, dry conditions this moisture difference between exposures would acquire gre...er importance for prehistoric agriculture (Cordell 1972; Woodbury 1961). Since exposure is not only a more accurate reflection of the temperature of an area than the average annual temperature but also affects the ground moisture content, it becomes an important variable in considering the agricultural potential of an area. Exposure can be monitored on topographic maps thereby increasing its utility for the purpose of this study.

ARABLE LAND CLASS STRATIFICATION

Criteria

Of the five variables which attribute to or detract from agricultural productivity, only slope and exposure could be easily quantified from existing information. Since slope and exposure are indirect measures of the other variables as well as direct factors which affect agricultural suitability, these two variables were selected to form the basis for the agricultural land classification presented in this study.

Slope and exposure accentuate each other's individual effect (Chang 1968:95; Tansley 1923:143); the combination of these two should allow the generation of accurate arable land classes. Like the capability classes of the SCS, the land classes based on combinations of slope and exposure are an interpretive classification of the environment for agricultural purposes. It is assumed that gentle slopes are preferred to the steeper slopes which require a greater labor investment. It is also assumed that gentle slopes are preferred to the steeper slopes which require a greater labor investment. It is further assumed that the southern exposures, especially on the steeper slopes, will be preferred because of their tendency to warm up quicker thus increasing the length of the growing season.

Procedure

The classes of agriculture land based on the combination of both slope and exposures were generated using 7.5 minute USGS topographic maps. First, four separate slope categories were plotted directly on the maps using a USGS Land Area and Slope Indicator.

The next step in the generation of agricultural classes was the creation of an overlay for each topographic map showing the exposures of the land forms. North and south were placed into separate categories because of the many references to the temperature differences between north and south (Chang 1968:94; Tuan 1969:68; Weaver 1945:220; Volobuev 1963:81). One of the few sources which not only mentioned the temperature difference between east and west but also ranked them in relationship to other exposures was Volobuev (1963:81). In the two studies presented the temperature differences between east and west varied from 0.1 degree C to 1.5 degree C. Since there is such a small difference between the temperature of east and west exposures, for the purposes of this study east and west were combined. North was defined as 300 to 60 degrees; south encompassed 120 to 240 degrees, east 60 to 120 degrees; west 240 to 300 degrees. These compass designations assigned 120 degrees each to both north and south. The combined compass designations of east and west equals 120 degrees.

The maps with slope categories, overlaid with the exposures, allowed the creation of four major land classes each with three subdivisions based on exposure. Thus, a total of twelve land classes were generated.

Land Classes

Class 1 was defined as land which has a slope of less than 4% regardless of exposure. Although for most countries Class 1 land has a slope ranging from 1-2% or 1-3% (Hudson 1971:160), the smallest slope measureable on a 20 ft contour interval 7.5 minute quadrangle map is 4%. Since this was nearly flat land, exposure was not felt to be important. However, Class 1 land was subsequently divided into subclasses according to exposure: 1(a) north; 1(b) east-west; 1(c) south.

Class 2 was defined as land which has a slope from 4-6% with subclasses according to exposure: 2(a) north; 2(b) east-west; 2(c) south. While this slope designation crosscuts several SCS soil classes, the 6% maximum slope agrees with the maximum slope for Class 2 land in Israel (Hudson 1971:160). It was felt that the Israeli data was better suited for this part of the Southwest than SCS criteria. The slope indicator also allowed the measurement of 6% slopes. Exposure was now felt to be important, for the steepness of the slope increases the effect of exposure (Tansley 1923:143).

Class 3 was defined as land which has a slope from 6-15% with subclasses according to the exposure: 3(a) north; 3(b) east-west; 3(c) south. This range of slope lumps several of the SCS classes; however, it agrees with the slope range of Class 3 Israeli land (Hudson 1971: 160).

Class 4 was defined as land with slopes greater than 15% with subclasses according to exposure: 4(a) north; 4(b) east-west; 4(c) south. While several countries recognize lands with 25-35% slopes as arable (Hudson 1971: 160), no further distinctions were made according to slope. With each subdivision according to slope the area of the classes became increasingly smaller and increasingly time consuming to delimit.

Measurement

Areas representative of the different topographic situations within the study area were stratified according to different arable land classes (see Fig. II.5.1). These areas include a portion of the Pajarito Plateau and White Rock Canyon, a lower portion of the Pajarito Plateau before it grades into the floodplair f the Rio Grande, and a portion of the Santa Fe Drainage.

Three sample areas, which were representative of the study area, were selected for measurement and are illustrated in Figs. II.5.2-4. The measurement of the acreage of each of the land classes within these three topographic situations was accomplished by overlaying a grid divided into half kilometer square units (500m x 500m) on the topographic maps with slopes and exposures. Each of the units of the grid was further subdivided into 25 units each 100m on a side (totalling 25 hectares). For each half kilometer square unit which was designated by UTM coordinates, the amount of land in each class to the nearest half hectare was entered on Fortran coding sheets. A separate category of river was found necessary to maintain a constant ratio. Once the measurements for these areas were entered on Fortran coding sheets this information was keypunched.

Sample Area 1, selected from the upper Pajarito Plateau/White Rock Canyon area is characterized by a large percentage (68%) of Class 4 land. Class 3 constitutes 14% of the area, Class 2 10%, Class 1 5%. These latter classes are located along the mouth of arroyos, benches and mesa tops (see Table II.5.1).

A portion of the lower Pajarito, which encompassed parts of the Rio Chiquito and Bland drainages, was designated Sample Area 2. It shares many similarities with Sample Area 1. Class 4 characterizes the largest portion (61%) of the area. Class 3 constitutes 20% of the area, Class 2 11%, Class 1 6%. In each class, most of the land falls within the southern exposure (c) (see Table II.5.2).

Sample Area 2 was chosen to illustrate the mesa top, canyon bottom topography. As was true of the SCS data, the better land classes were small areas located on the mesa tops surrounded by larger areas of steeper land classes (see Fig. II.5.3).

A portion of the Santa Fe River Area, designated Sample Area 3, is unlike the two previously described sample areas. This area is characterized by large extents

TABLE II.5.1

ARABLE LAND CLASSES SUMMARY FOR SAMPLE AREA 1
(all measurements in ha)

UTM COORDINATES	1a	1b	1c	2a	2b	2c	3a	3b	3c	4a	4b	4c	River
^{3}91000mE^{39}61000mN			3.0			20.5	1.5		9.0		1.0	61.0	4.0
^{3}92000mE^{39}61000mN							18.5	12.5		34.5	33.0		1.5
^{3}91000mE^{39}62000mN		15.0	4.0		5.5	12.0		6.0	0.5		43.0	14.0	
^{3}92000mE^{39}62000mN				3.0	2.0		14.0	2.5	0.5	46.5	6.5	17.0	8.0
^{3}92000mE^{39}63000mN		0.5			5.5			5.5	0.5	7.5	49.0	31.5	
TOTALS		15.5	7.0	3.0	13.0	32.5	34.0	26.5	10.5	88.5	132.5	123.5	13.5
(per cent)		3.1	1.4	0.6	2.6	6.5	6.8	5.3	2.1	17.7	26.5	24.7	2.7

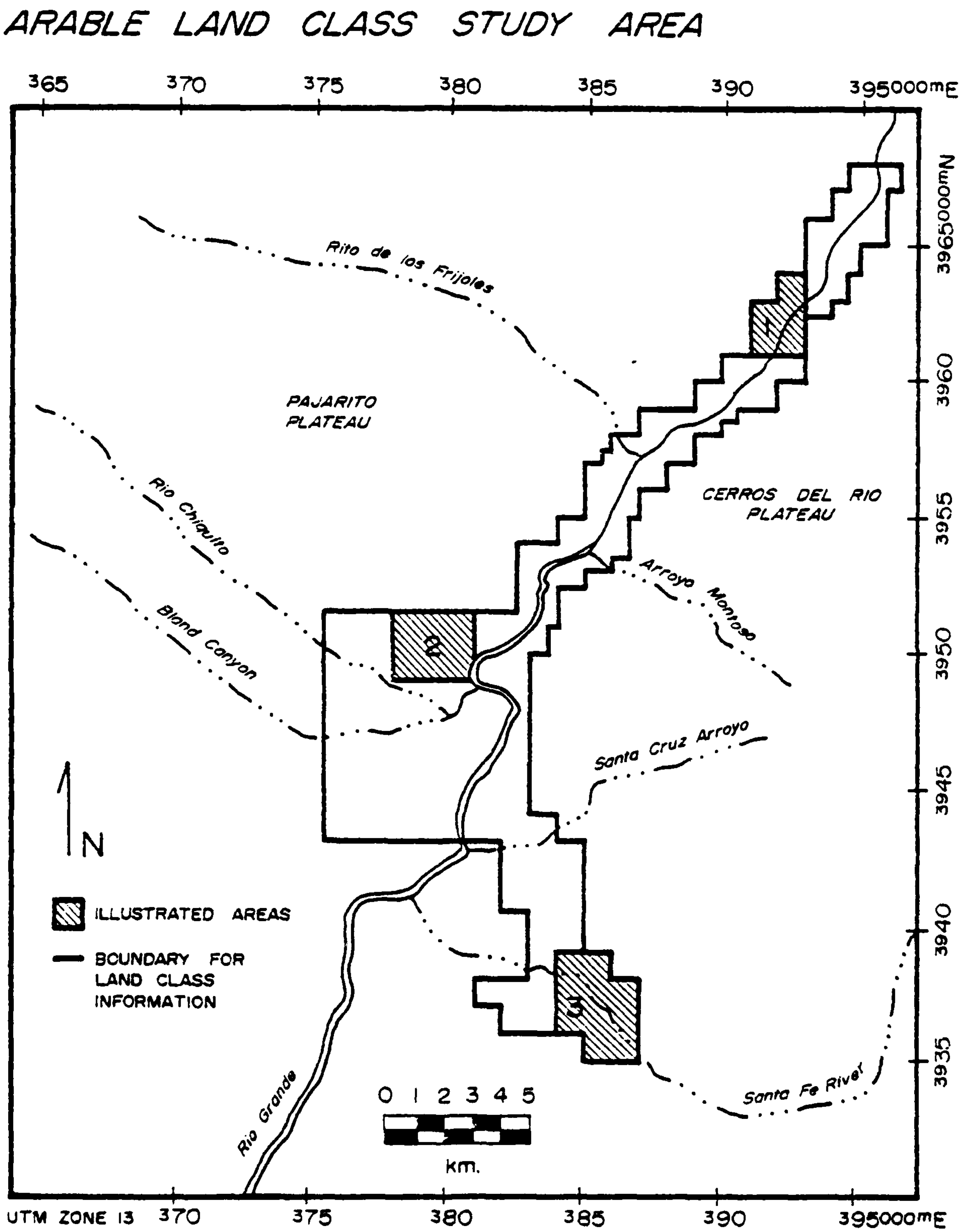


FIG. II.5.1 Arable Land Class Study Area

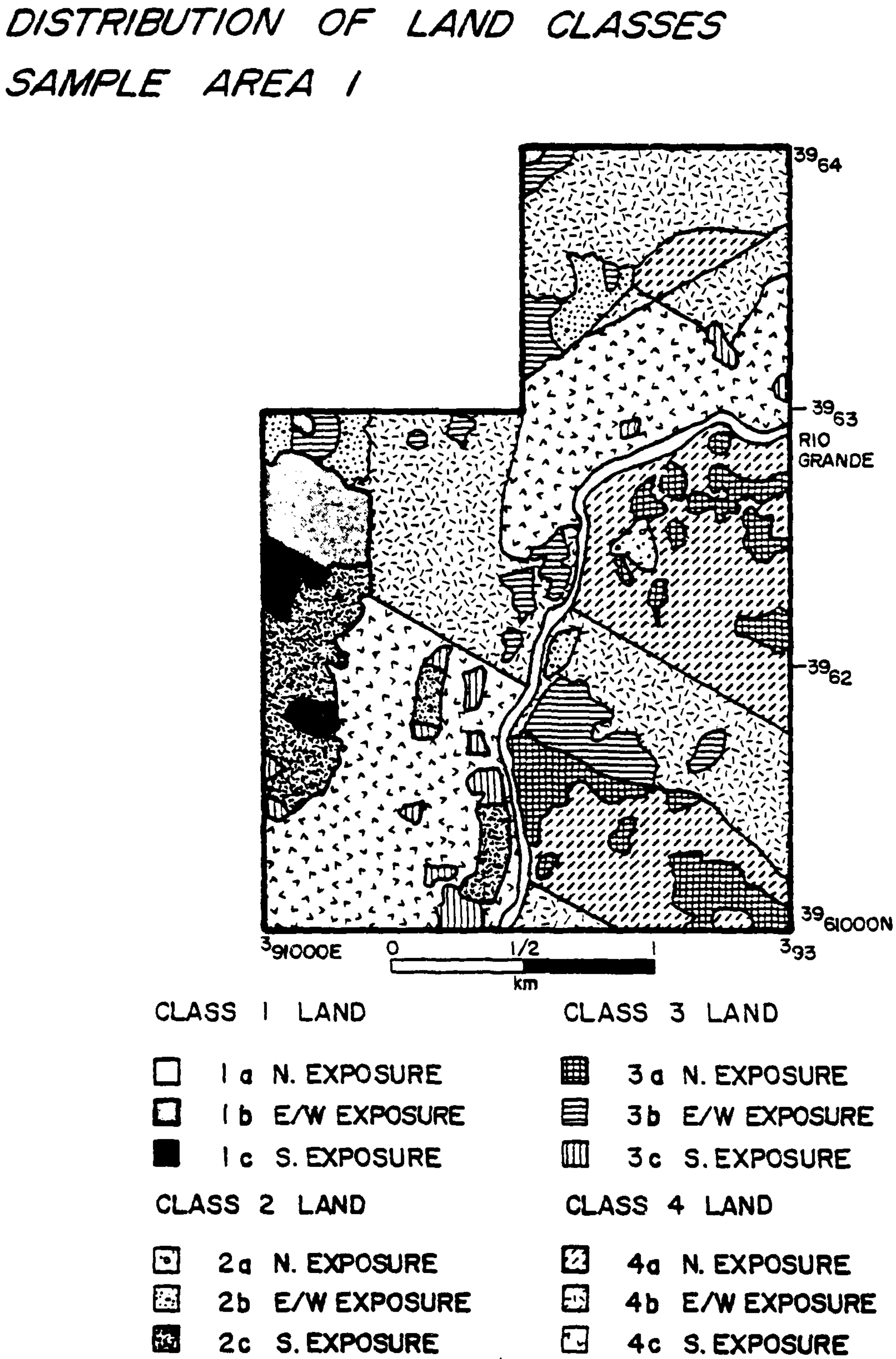
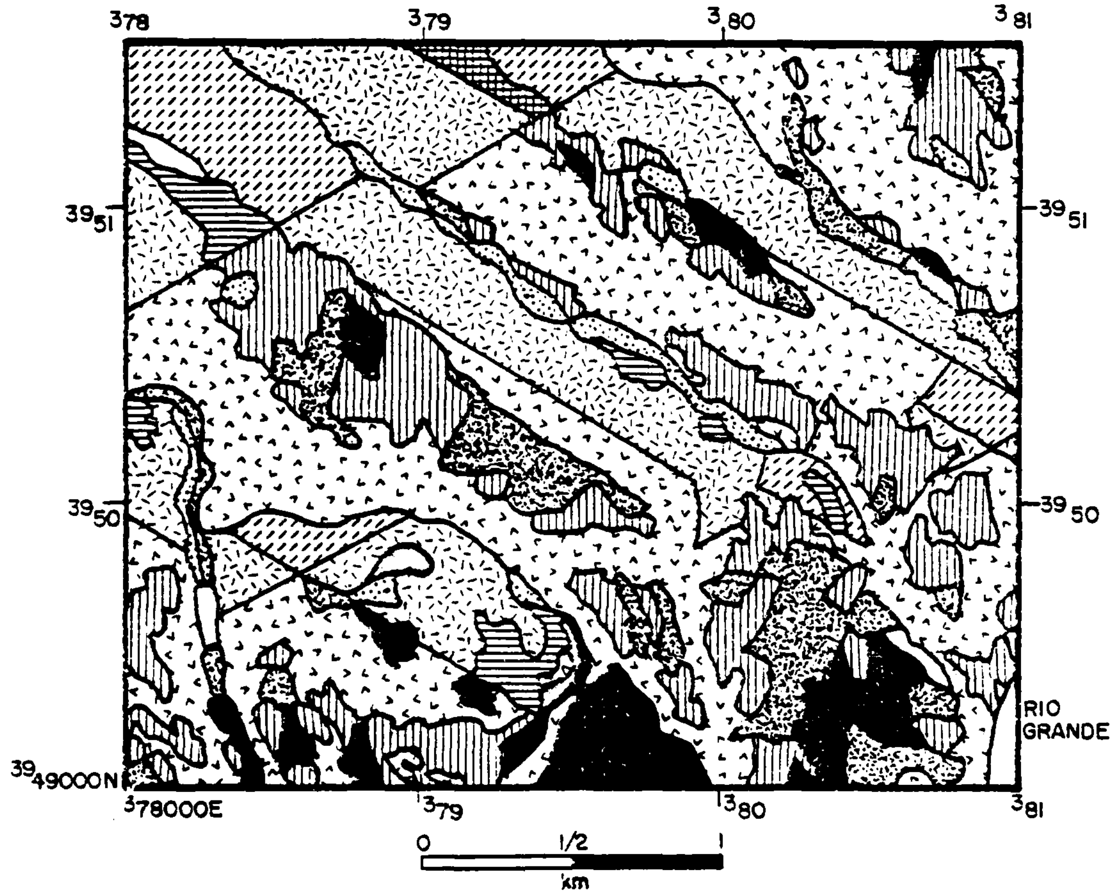


FIG. II.5.2 Distribution of Arable Land Classes for Sample Area 1

DISTRIBUTION OF LAND CLASSES

SAMPLE AREA 2



CLASS 1 LAND

- 1a N. EXPOSURE
- 1b E/W EXPOSURE
- 1c S. EXPOSURE

CLASS 2 LAND

- 2a N. EXPOSURE
- 2b E/W EXPOSURE
- 2c S. EXPOSURE

CLASS 3 LAND

- 3a N. EXPOSURE
- 3b E/W EXPOSURE
- 3c S. EXPOSURE

CLASS 4 LAND

- 4a N. EXPOSURE
- 4b E/W EXPOSURE
- 4c S. EXPOSURE

FIG. II.5.3 Distribution of Arable Land Classes for Sample Area 2

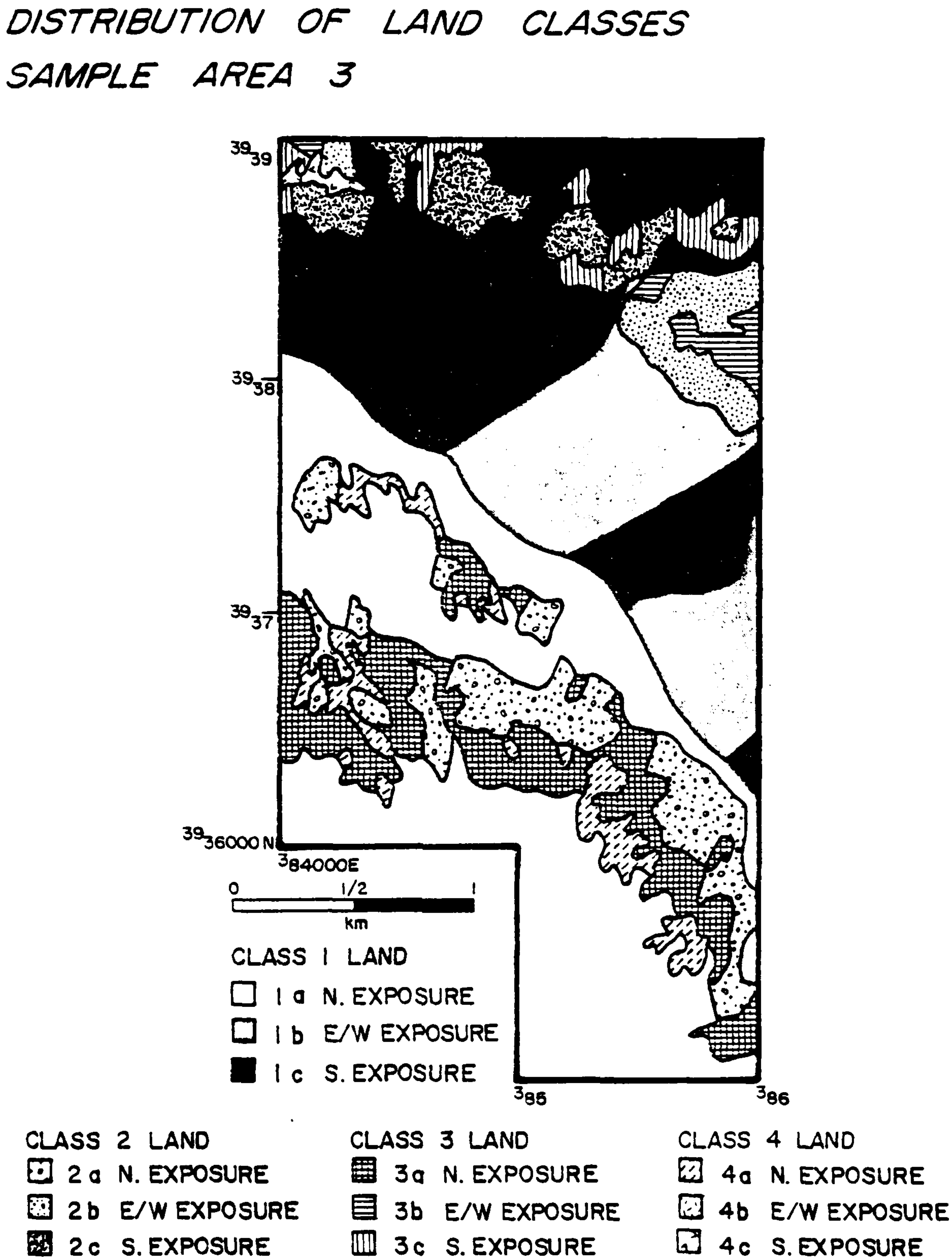


FIG. II.5.4 Distribution of Arable Land Classes for Sample Area 3

TABLE II.5.2

ARABLE LAND CLASSES SUMMARY FOR SAMPLE AREA 2
(all measurements in ha)

UTM COORDINATES	1a	1b	1c	2a	2b	2c	3a	3b	3c	4a	4b	4c	River
^{3}78000mE^{39}49000mN		2.0	7.5		3.0	3.5			18.0	6.0	16.5	43.5	
^{3}79000mE^{39}49000mN			15.5		1.5	5.5		6.0	19.0		14.5	38.0	
^{3}80000mE^{39}49000mN			12.0			27.0		1.0	26.5		4.5	26.5	2.5
^{3}78000mE^{39}50000mN			3.0		1.5	10.0		7.0	19.5	2.0	24.0	33.0	
^{3}79000mE^{39}50000mN			1.0		2.0	15.5		2.0	12.5		28.0	39.0	
^{3}80000mE^{39}50000mN		0.5	3.0	0.5	3.5	4.5	0.5	2.0	17.5	7.5	21.5	39.0	
^{3}78000mE^{39}51000mN*	1.5				0.5			2.5		26.0	19.5		
^{3}79000mE^{39}51000mN*			1.0		1.0		2.5	1.5	3.5	8.0	17.5	15.0	
^{3}80000mE^{39}51000mN*			0.5			3.5			13.5		3.5	29.0	
TOTALS	1.5	2.5	43.5	0.5	13.0	69.5	3.0	22.0	130.0	49.5	149.5	263.0	2.5
(per cent)	0.2	0.3	5.8	0.06	1.7	9.2	0.4	2.9	17.3	6.6	19.9	35.0	0.3

* Only 50 ha were measured in these kilometer units. Refer to Fig.II.5.1.

TABLE II.5.3

ARABLE LAND CLASSES SUMMARY FOR SAMPLE AREA 3
(all measurements in ha)

UTM COORDINATES	1a	1b	1c	2a	2b	2c	3a	3b	3c	4a	4b	4c	River
^{3}85000mE^{39}35000mN	69.5			10.0			15.5			5.0			
^{3}84000mE^{39}36000mN	44.0			21.5			29.0			5.5			
^{3}85000mE^{39}36000mN	28.5	23.5	1.5	24.5			17.0			5.0			
^{3}84000mE^{39}37000mN	39.0	11.0	15.5	6.5			4.5			3.5			
^{3}85000mE^{39}37000mN	7.5	39.0	26.5	1.0	5.0		0.5	0.5					
^{3}84000mE^{39}38000mN	1.5		70.0		2.0	19.0		1.0	4.0			2.5	
^{3}85000mE^{39}38000mN		6.5	52.0		14.0	11.5		7.5	8.5				
TOTALS	210.0	100.0	165.5	63.5	21.0	30.5	66.5	9.0	12.5	19.0		2.5	
(per cent)	30.0	14.28	23.64	9.0	3.0	4.35	9.5	1.28	1.78	2.7		0.35	

of Class 1 land which comprises 68% of the land. Class 2 comprises 16% of the land, Class 3 12%, Class 4 3%. These latter classes form a mosaic around the arroyos. Within all the land classes in this sample area much of the land has a northern exposure (see Table II.5.3).

SUMMARY

In order to create agricultural land classes soil types, slope, erosion, climate and exposure, which are attributes of the environment considered to influence the agricultural capability of the land, were examined to determine their suitability for use as the basis of land classes for prehistoric agriculture in the Cochiti area. Slope and exposure, which can be monitored on topographic maps, provide indirect measures of the other variables. Combinations of slope and exposure created a total of twelve land classes. The measurement of the area of each land class was accomplished by overlaying a grid divided into hectares onto the topographic maps with slopes and exposures plotted on them.

In general this stratification resulted in a mosaic of small areas of different land classes. In the Pajarito Plateau and White Rock Canyon areas, Class 1 and 2 lands were small areas located on the mesa tops. These were surrounded by larger tracts of Class 3 and 4 lands. Only along the Santa Fe River were large extents of Class 1 lands located. It is hoped that this stratification, taken in conjunction with Brakenridge's study of water availability, will provide a basis for examining some aspects of Anasazi land utilization.

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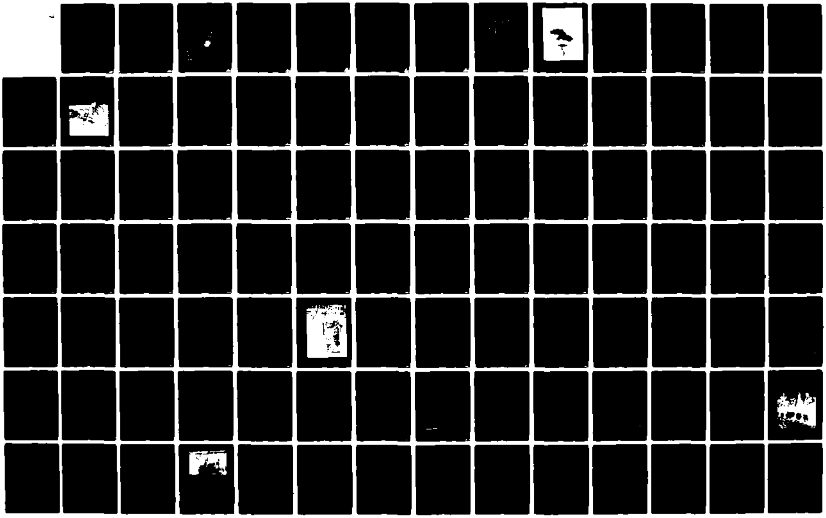

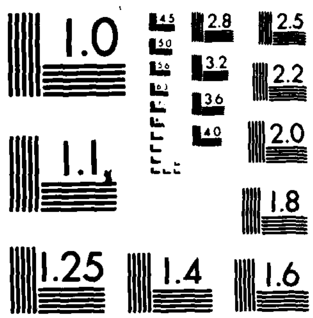

MICROCOPY RESOLUTION TEST CHART
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II.6
Present Water Supply in the Cochiti Study Area, Northcentral New Mexico

G. ROBERT BRAKENRIDGE

INTRODUCTION

The primary objective of this study is to evaluate the potential availability of runoff water for floodwater and/or irrigation agriculture in the general Cochiti area (see Fig. II.6.1). The results obtained serve as one basis for the formulation of predictive statements which concern Anasazi agricultural land utilization (see Volume 4). Indices based upon present runoff patterns were developed to allow a quantitative comparison of the April-May and August-September stream flows for forty-one drainage basins within this general area. From these indices, each drainage basin was ranked according to its runoff potential. The April-May and August-September flow periods were selected for monitoring because it is during these particular seasons that water is most needed for the successful cultivation of maize (Allan n.d.).

STREAM FLOWS FOR THE COCHITI AREA

Discharge Basin Area Relations from Nearby Streams

Within the Cochiti area, published flow measurements were available for only three drainages: Rito de los Frijoles, Santa Fe River (incomplete records) and Bland Canyon (peak flows only) (U.S.G.S. 1970: 524, 539, 822). In order to describe seasonal stream flow at other drainages in the Cochiti area, basins with stream flow measurements, outside the area, were used to define a pattern of discharge-basin area relations. Only gauged basins with physiographic characteristics similar to the Cochiti basins were selected.

It was difficult to locate suitable basins. After an examination of topographic maps, only eight basins (in addition to Rito de los Frijoles) were found which were comparable to basins within the Cochiti area. Many gauged streams in New Mexico were excluded because their headwaters were at elevations of 12,000 ft or more whereas streams in the Cochiti area extend only to 11,200 ft. The selected basins are listed in Table II.6.1 along with their basin area statistics and five year mean flows (1965-1970) for the April-May and August-September seasons. The flow statistics and basin area statistics were obtained from U.S. Geological Survey data (U.S.G.S. 1970), whereas the basin areas above 8000 ft were obtained by planimeter measurement of the following 1:62500 scale U.S.G.S. topographic maps: Jemez Springs, N.M.; Frijoles, N.M.; Espanola, N.M.; Jemez, N.M.; Santo Domingo Pueblo, N.M.; Agua Fria, N.M.

Discharge and Basin Area Over 8000 Foot Elevation

The percentage area of basin over 8000 ft elevation was included in Table II.6.1 to accomodate differences in precipitation which acrue with elevation in the general Cochiti area. A common situation in this area is the presence of two basins whose areas are approximately equal; though one stream, flowing out of the Cerros del Rio Plateau to the east of White Rock Canyon, may drain land which is almost entirely at moderate or low elevations, whereas another stream which flows out of the Jemez Mountains to the west may drain considerable area at higher elevations. Since elevations in excess of 8000 ft experience annual snowfalls of 100 inches or more (see Figure II.6.2) and the snow usually melts during the months of April and May, basins with large amounts of such areas should experience higher flows during this season than equally sized basins without such areas.

Although summer precipitation also increases with elevation in the general Cochiti area, August-September flows of similarly sized basins depend to a much lesser extent on the proportion of areas at high elevations. Figure II.6.3 shows this situation to be true for the nine basins monitored in Table II.6.1. April-May runoff per square mile of basin area increases rapidly with increased percentage of total basin area over 8000 ft. By contrast, August-September runoff is nearly constant until the majority of the basin area is at a high elevation.

Discharge Per Square Mile/Percent Basin Over 8000 Foot Contours

The mean runoff per square mile (c.f.s./sq. mile) for each of the nine basins summarized in Table II.6.1 were plotted against the percentage of basin area over 8000 ft in elevation to derive April-May and August-September curves which could be used as an index for stream flows for the forty-one basins within the Cochiti area (see Fig. II.6.3). It was felt that these two curves would best reflect the differences between the winter and summer precipitation in the Cochiti area and the resultant stream flows.

By use of a least-squares computer program, a curve described by a second degree equation was fit to the April-May points. Correlation coefficient r was equal to .916 for this equation (r = .912 for the generated equation defining a straight line). The August-September points were not so amenable to this method of curve fitting; they defined a flat line up to 70%, above which they defined a steeply rising curve. All polynominal best-fit equations from second to sixth degree had a region of slight downward-convex curvature between 10% and 70%. This appeared to be a spurious effect induced by the small number of points. A first degree (straight line) equation also seemed inapplicable. Therefore, this curve was drawn by hand. It is identical to the best-fit second degree curve (r = .846) except that the

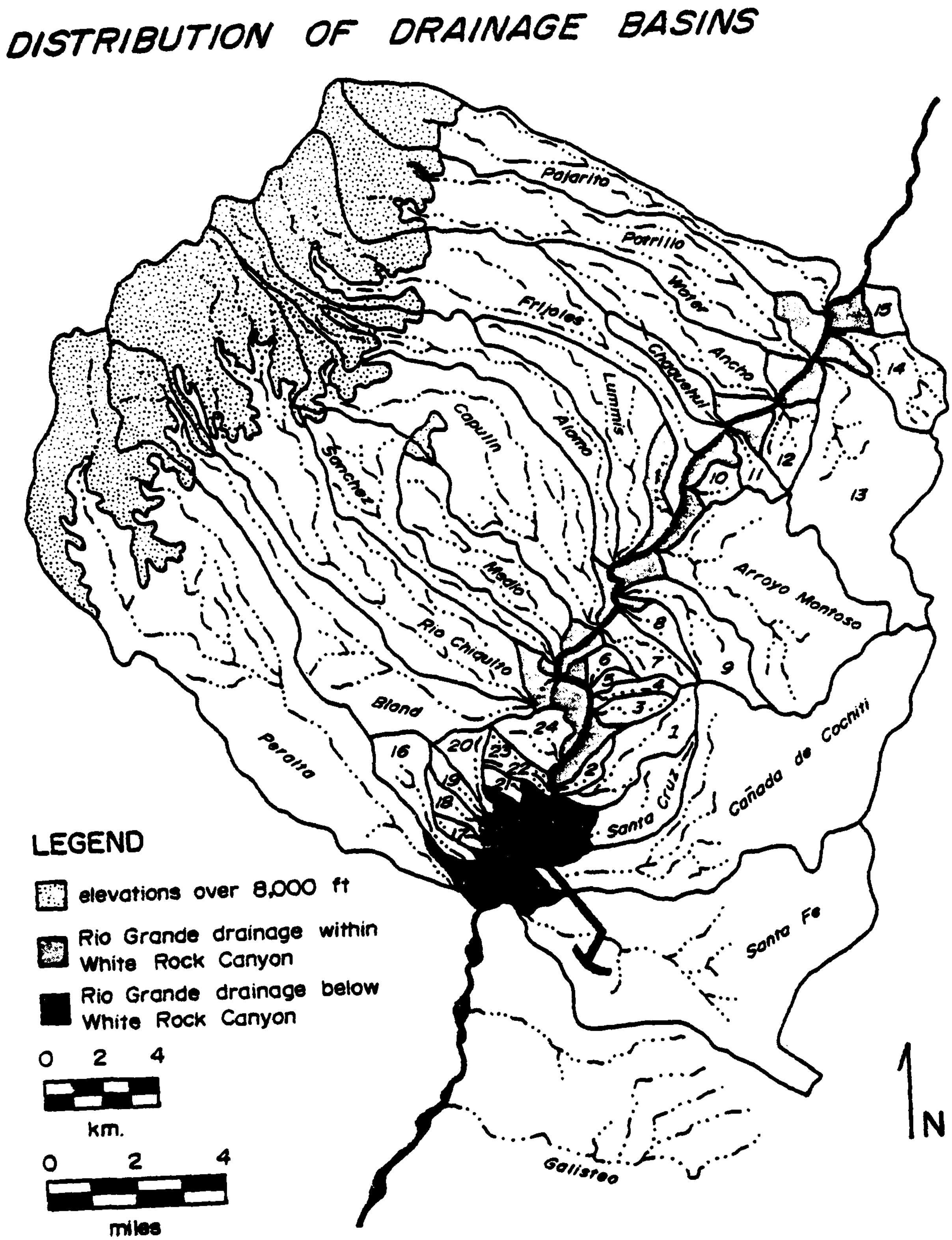


FIG. II.6.1 Distribution of Drainage Basins

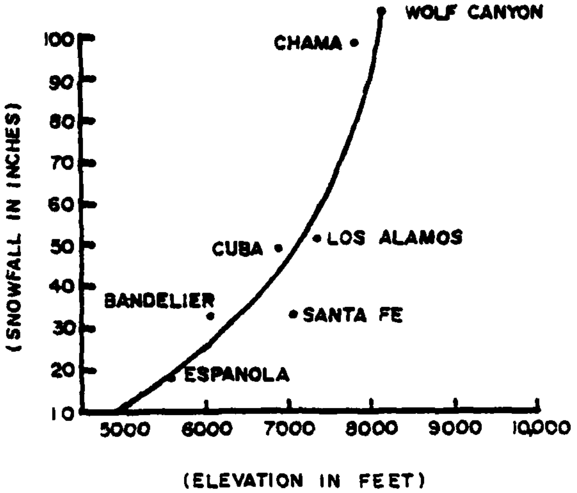


FIG. II.6.2 Increase of Mean Snowfall with Elevation for Jemez Mountain Region

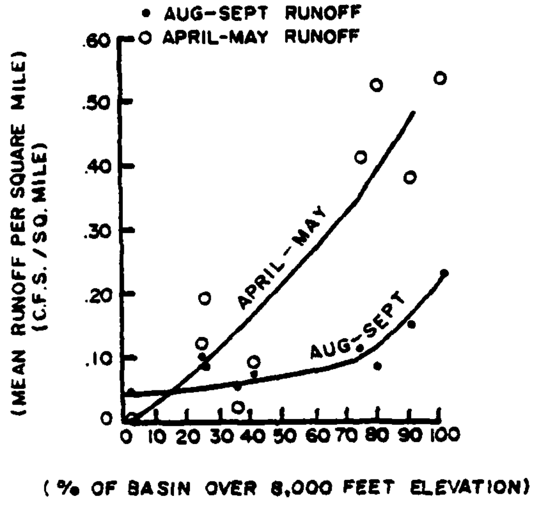


FIG. II.6.3 Mean Runoff per Square Mile of Total Basin Area Plotted Against Percent of Basin Area Over 8000 Foot Elevation

region of slight downward convexity was eliminated.

The two curves, thus produced, are powerful tools; they allow the quantitative comparison of stream flows of similar basins, if basin area and percentage of basin area over 8000 ft are known. Both of these figures are readily obtainable from topographic maps.

Compilation of Water Supply Indices for the Cochiti Area

In order to use the curves developed in the previous section, the total basin area and percentage of basin area over 8000 ft must be known. Table II.6.2 summarizes this information for each of the forty-one basins examined within the Cochiti study area. Using the curves generated in Fig. II.6.3, values of discharge per square mile were then obtained for each basin and multiplied by respective total basin area to obtain the water supply indices which are shown in Table II.6.3. These figures were computed in the following fashion:

For Peralta Canyon, for example, the total basin area is 30.2 square miles and the percentage of basin area above 8000 ft is 43%. Referring to Fig. II.6.3, it then can be seen that the April-May value of discharge per square mile is 0.175, while the August-September value of discharge per square mile is 0.07. In order to obtain the water supply index, the April-May value of 0.175 is multiplied by the total basin area of 30.2 square miles (0.175 c.f.s./sq. mi. x 30.2 sq. mi.) to yield 5.3 c.f.s. index. Similarly, to obtain the water supply index for August-September discharge, the value of 0.07 is multiplied by the total basin area of 30.2 which yields a figure of 2.1 c.f.s.

These indices should not, however, be used as estimates of actual mean flows, because all these streams exhibit great year to year variation. Instead, the indices serve to compare mean flows in a quantitative fashion: that is, if Basin A has an April-May index of 2 c.f.s. and Basin B has an April-May index of 4 c.f.s., then Basin B should have about twice the mean stream flow during these months as Basin A, although perhaps not exactly 4 c.f.s.

Ranking of Streams in the Cochiti Study Area

Rather than ranking separately each of the drainage systems for April-May and August-September, the arithmetic average of each stream's indices (which are also given in Table II.6.3) was felt to represent best the relative availability of water supply for agricultural purposes. The streams are thus ranked, from highest to lowest: Santa Fe River, Bland Canyon, Peralta Canyon, Rio Chiquito, Rito de los Frijoles, Water Canyon, Alamo Canyon, Pajarito Canyon, Capulin Canyon, Canada de Cochiti (Tetilla Canyon), Arroyo Montoso, Basin No. 13, Sanchez Canyon, Lummis Canyon, Ancho Canyon, Medio Canyon, Santa Cruz Arroyo, Basin Nos. 9, 1, 2, 14, 16, 24, 12, Chaquehui Canyon, Basin Nos. 20, 8, 3, 11, 4, 6, 10, 15, 19, 23, 7, 17, 18, 21, 22 and 5.

DISCUSSION AND CONCLUSIONS

Wide variation exists in flows between superficially similar streams in the Cochiti area. One set of streams, those draining the Jemez Mountains and entering the Rio Grande from the west, seem quite similar; they all have elongated basins and flow in narrow canyons which end when they reach White Rock Canyon and the Rio Grande. At the Rio Grande, these streams have created wide flat fan-shaped alluvial deposits. However, examination of Fig. II.6.1 will reveal two important facts: 1) these streams differ widely in the amount of total basin area over 8000 ft, and 2) they differ to a lesser extent in their total basin areas. These parameters are quantifiable. By simple relationships established from other streams whose flows have been measured over the years, these parameters have been translated into expected April-May and August-September stream flows. Since actual flows during a dry-year will be much less than those during a wet-year, these expected flows function as indices to compare one basin with another. The

TABLE II.6.1

FLOW AND BASIN AREA STATISTICS FOR GAUGED STREAMS

BASIN NAME AND GAUGE SITE NUMBER	Max/Min Elevation (ft)	Total Basin Area (sq mi)	Basin Area Above 8000 ft. (sq mi)	%Basin Area Above 8000 ft. (sq mi)	Mean Annual Flow (c.f.s.)	Mean April-May Flow (c.f.s.)	Mean Aug-Sept Flow (c.f.s.)	Mean April-May Runoff/sq mi	Mean Aug-Sept Runoff/sq mi
Jemez River near Jemez (08324000)	11254 5622	352.8	352.8	75%	65.6	194.0	53.0	.5499	.1502
Rio Guadalupe at Box Canyon (08323000)	9598 6015	235.0	188.8	80%	32.6	122.0	19.0	.5191	.0809
Jemez River below East Fork (08321500)	11254 6200	173.0	158.0	91%	26.2	66.0	26.0	.3815	.1036
Willow Creek near Oak View (08384500)	6944	193.0	49.0	24%	26.0	10.5	21.0	.1243	.0893
Horselake Creek above Hebron Reservoir (08284300)	9010 7000	45.0	16.0	36%	1.1	0.94	2.7	.0209	.0600
Rito de los Frijoles (08313350)	9000 6000	19.3	8.0	41%	1.2	1.85	1.4	.0959	.0725
Grants Canyon (08343100)	8247 6400	13.0	0.4	3%	0.22	0.05		3.8462	.0538
Little Tesuque (08304100)	11000 7000	0.6	0.6	100%	0.17	0.34		.5313	.2347

TABLE II.6.2

BASIN AREAS FOR RIO GRANDE TRIBUTARIES

BASIN NAME OR NUMBER	Total Basin Area (sq. mi.)	Basin Area Above 8000 ft. (sq. mi.)	Percent of Area Above 8000 ft.
EAST SIDE OF RIO GRANDE			
Santa Fe River	258.5	28	11
Canada de Cochiti (Tetilla)	24.8	0	0
Santa Cruz Arroyo	3.5	0	0
Basin Number:			
1	3.4	0	0
2	0.45	0	0
3	1.0	0	0
4	0.8	0	0
5	0.3	0	0
6	0.8	0	0
7	0.7	0	0
8	1.1	0	0
9	3.8	0	0
Arroyo Montoso	15.5	0	0
Basin Number:			
10	0.8	0	0
11	1.0	0	0
12	1.8	0	0
13	13.6	0	0
14	3.2	0	0
15	0.8	0	0
WEST SIDE OF RIO GRANDE			
Peralta Canyon	30.2	13.1	43
Basin Number:			
16	2.6	0	0
17	0.5	0	0
18	0.8	0	0
19	0.8	0	0
20	1.4	0	0
21	0.5	0	0
22	0.36	0	0
23	0.8	0	0
24	1.9	0	0
Rio Chiquito above junction with Bland	29.9	12.8	43
Bland Canyon	47.6	16.3	34
Sanchez Canyon	7.8	0	0
Medio Canyon	6.7	0.1	1
Capulin Canyon	20.0	2.8	14
Alamo Canyon	11.6	4.1	35
Lummis Canyon	7.8	0	0
Frijoles Canyon	19.5	0	0
Chaquehui Canyon	1.7	0	0
Ancho Canyon	7.2	0	0
Water Canyon	19.0	6.1	32
Pajarito Canyon	13.4	3.4	25

arithmetic average of these two expected flows is considered the best way to compare the water supply available for agricultural purposes.

Of the streams which drain the Jemez Mountains, Bland Canyon (4.65), Peralta (3.70), Rio Chiquito (3.65), Rito de los Frijoles (2.30), Water Canyon (1.75), Alamo (1.15), Pajarito (1.00) and Capulin (1.00) are the leaders. These streams are also the only ones with appreciable April-May indices. The other streams in this group include Sanchez Canyon (0.199), Lummis Canyon (0.199), Ancho Canyon (0.184) and Medio Canyon (0.171), with average indices ranging from 0.199 to 0.171. These streams have little basin area at high elevations and are, thus, usually dry during the spring.

Another group consists of the small numbered washes which enter the river from both sides. They have average indices which range from 0.089 to 0.033. Chaquehui Canyon is also included in this group, because of its

TABLE II.6.3

COMPILATION OF WATER SUPPLY INDICES

BASIN NAME OR NUMBER	Total Basin Area (sq. mi.)	Estimated Runoff Per Square Mile April-May	Estimated Runoff Per Square Mile Aug-Sept	Water Supply Index (c.f.s.) April-May	Water Supply Index (c.f.s.) Aug-Sept	Water Supply Index (c.f.s.) Average
Santa Fe River	258.5	0.03	0.05	7.75	12.9	10.32
Bland Canyon	47.6	0.13	0.065	6.2	3.1	4.65
Peralta Canyon	30.2	0.175	0.07	5.3	2.1	3.70
Rio Chiquito above junction with Bland	29.9	0.175	0.07	5.2	2.1	3.65
Rito de los Frijoles	19.5	0.165	0.07	3.2	1.4	2.30
Water Canyon	19.0	0.121	0.065	2.3	1.2	1.75
Alamo Canyon	11.6	0.135	0.065	1.6	0.7	1.15
Pajarito Canyon	13.4	0.089	0.06	1.2	0.8	1.00
Capulin Canyon	20.0	0.043	0.055	0.9	1.1	1.00
Canada de Cochiti (Tetilla)	24.8	0.001	0.05	0.0248	1.24	0.632
Arroyo Montoso	15.6	0.001	0.05	0.0156	0.78	0.398
Basin Number: 13	13.6	0.001	0.05	0.0136	0.68	0.347
Sanchez Canyon	7.8	0.001	0.05	0.0078	0.39	0.199
Lummis Canyon	7.8	0.001	0.05	0.0078	0.39	0.199
Ancho Canyon	7.2	0.001	0.05	0.0072	0.36	0.184
Medio Canyon	6.7	0.001	0.05	0.0067	0.335	0.171
Santa Cruz Arroyo	3.5	0.001	0.055	0.0037	0.175	0.089
Basin Number: 9	3.8	0.001	0.05	0.0038	0.19	0.087
1	3.4	0.001	0.05	0.0034	0.175	0.089
2	3.4	0.001	0.05	0.0034	0.17	0.087
14	3.2	0.001	0.05	0.0032	0.161	0.082
16	2.6	0.001	0.05	0.0026	0.13	0.066
24	1.9	0.001	0.05	0.0019	0.095	0.048
12	1.8	0.001	0.05	0.0018	0.09	0.046
Chaquehui Canyon	1.7	0.001	0.05	0.0017	0.085	0.043
Basin Number: 20	1.4	0.001	0.05	0.0014	0.07	0.036
8	1.1	0.001	0.05	0.0011	0.055	0.028
3	1.0	0.001	0.05	0.0010	0.05	0.026
11	1.0	0.001	0.05	0.0010	0.05	0.026
4	0.8	0.001	0.05	0.0008	0.04	0.020
6	0.8	0.001	0.05	0.0008	0.04	0.020
10	0.8	0.001	0.05	0.0008	0.04	0.020
15	0.8	0.001	0.05	0.0008	0.04	0.020
19	0.8	0.001	0.05	0.0008	0.04	0.020
23	0.8	0.001	0.05	0.0008	0.04	0.020
7	0.7	0.001	0.05	0.0007	0.035	0.018
17	0.5	0.001	0.05	0.0005	0.025	0.013
18	0.5	0.001	0.05	0.0005	0.025	0.013
21	0.5	0.001	0.05	0.0005	0.025	0.013
22	0.36	0.001	0.05	0.0004	0.018	0.004
5	0.3	0.001	0.05	0.0003	0.015	0.003

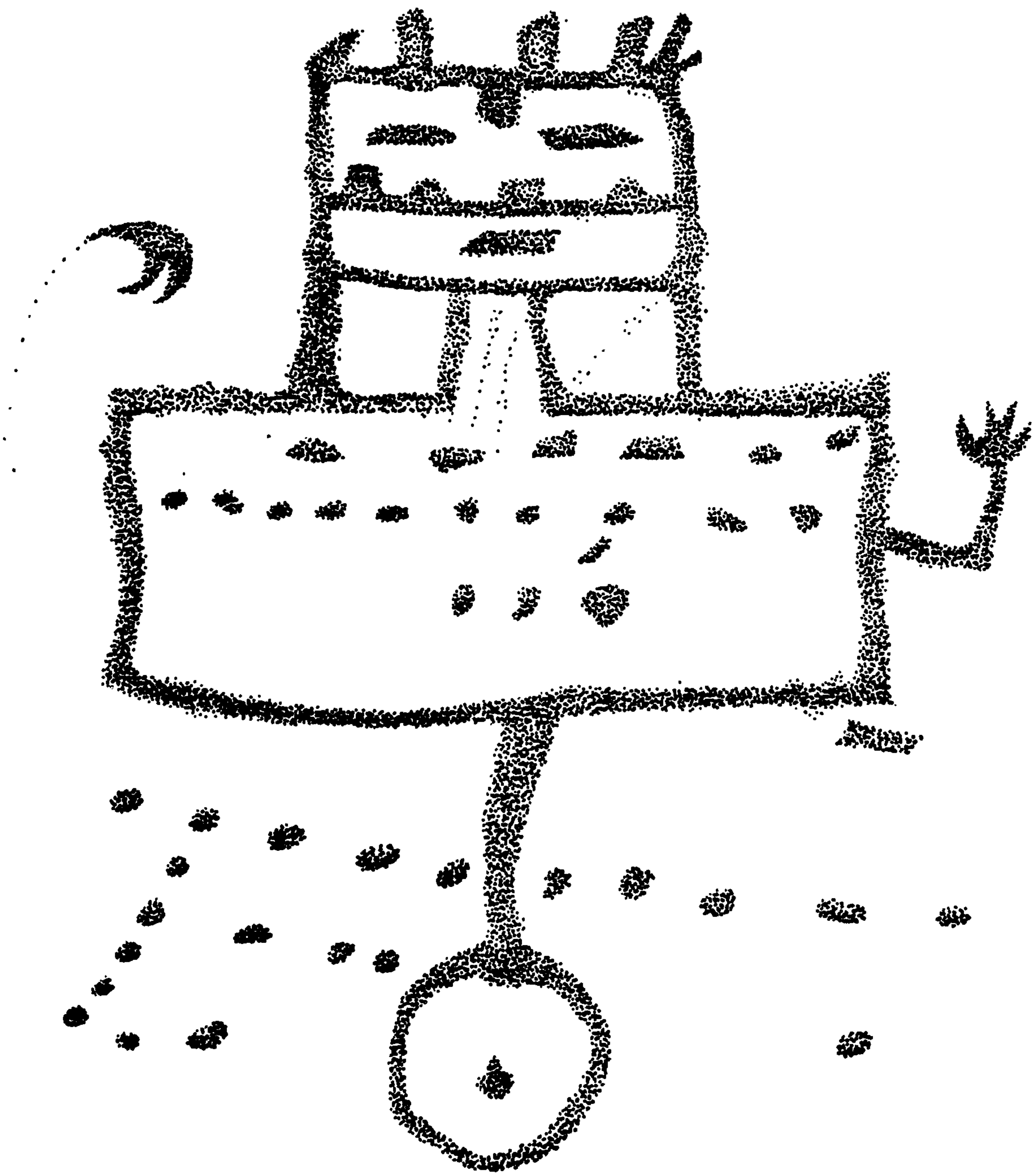
small basin size and small index (0.043).

A third group includes Canada de Cochiti (Tetilla Canyon) (0.632), Arroyo Montoso (0.389) and Basin No. 13 (0.347). Arroyo Montoso and Basin No. 13 enter the Rio Grande in White Rock Canyon, but in other respects are similar to the Canada de Cochiti which enters the river below White Rock Canyon in the alluvial plain of the Rio Grande. These streams are fairly large basins without areas above 8000 ft in elevation. The flows which they experience are a product of their large basin areas, not of areas of land at high elevation. They are primarily summer-flow streams, whereas streams draining the Jemez Mountains experience higher flows in the spring.

The Santa Fe drainage stands alone, because its average index (10.32) is the highest by a factor of two, and because it is the only drainage whose basin area includes diverse topography which is dissimilar to that of the rest of the Cochiti study area. It drains the Sangre de Cristo Mountains 30 miles to the east. It also loses much of its streamflow into the porous Santa Fe sediments near the Rio Grande. Thus, its computed indices very likely are not an accurate representation of its flow regime and should be used with caution, if at all.

Two final points need to be made. First, because the streams are in different topographic and geologic situations (see Warren Section II, Chapter 1, this volume), stream flow indices may differ by several orders of

magnitude; thus, the indices are best used to compare streams within the groups outlined above. For example, ratio of water supply obtained by comparing Peralta Canyon (3.70) and Capulin Canyon (1.00) should be quite accurate, whereas the ratio obtained by comparing Peralta and Basin No. 1 (.089) cannot be quite as accurate. Second, it is useful to employ all three indices (April-May, *August-September* and *the arithmetic* average) in testing various archeological hypotheses involving site densities and distributions. Dependent upon the specific strategy of agricultural technology employed, availability and predictability of spring moisture may be more critical for maize agriculture than that of late summer, or vice versa. Thus, the average has its benefits in that it allows the approximate ranking of streams for the entire April to September growing season, but its use alone could prevent a significant discovery: that most sites are near snowmelt-fed streams.



(Photograph by William P. Winn)

II.7
Paleoclimatic Variability in the North-Middle Rio Grande, New Mexico

ANNE C. CULLY

INTRODUCTION

What was the environment like in the White Rock Canyon area 500 to 5000 years ago? Such a question is difficult to answer and perhaps impossible to answer with certainty. The best clues come from several sources: geology, palynology and dendroclimatology. The techniques used to reach conclusions about environmental change through time in these various fields are far from being error free. In addition, specific paleoclimatological data for the Cochiti Reservoir study area are not available. Reconstructing past climatic variability within the study area must thus involve collating different realms of information from the Southwest in general in order to isolate periods of climatic changes applicable to the north-middle Rio Grande. The difficulty in such a study lies not only in the lack of precision in various techniques and the lack of data from the study area, but in the relatively narrow span of time under scrutiny. Short cycles of prehistoric weather change are not easy to distinguish with accuracy. Nevertheless, this paper will attempt to integrate some information about the past climate in the Southwest from several disciplines, with the view that such information will apply generally to the north-middle Rio Grande Valley in New Mexico.

GEOLOGIC EVIDENCE

With the end of the Pleistocene approximately 10,000 to 12,000 B.P. (Martin 1963), conditions in the Southwest became warmer and drier with recurring episodes of moist-cool conditions. Antevs (1955) proposed a general scheme of climatic change after the last glacio-pluvial episode, which includes the Altithermal, or Long Drought in the west, beginning around 7500 B.P. and ending around 4000 B.P. He found evidence for this in recurring episodes of arroyo cutting and filling, accumulation of caliche layers and rates of salt accumulation in closed basin lakes. Antevs suggests that an increase in temperature of 4° F and a decrease in precipitation caused increasingly drier conditions.

4000 B.P. marks the end of the Altithermal and the beginning of the Medithermal, during which Antevs proposed that temperature and precipitation were similar to the present. A decrease in xerothermic plants, accumulation of water in desert basins, stabilization of dunes, arroyo filling and development of glaciers in high mountains are evidence for the Medithermal (Antevs 1955). Recent information from the Southwest corroborates Antev's concepts (Bachuber 1971; Haynes 1975).

Lake Estancia in central New Mexico provides a record of climatic oscillations in the area from 45,000 B.P. to the present (Bachuber 1971). Such closed basins are sites of accumulation of layers of sediments which are relatively undisturbed and provide opportunities for environmental reconstruction and for correlation with other areas.

About 8500 B.P. Lake Willard was formed in the basin. Its shoreline was at 6225 ft (1897m) and the lake was about 164 ft (50m) deep. By 6000 B.P. complete dessication of the lake had occurred. At 4000 B.P. a smaller lake, Lake Meinger, was formed. Its shoreline was at 6100 ft (1897m) and its depth was about 66 ft (20m). The lake was dessicated by 3000 B.P. The Willard Playa Complex consequently formed is visible today.

Bachuber (1971) thus places the beginning of the Altithermal for the Estancia Basin, which is marked by the dessication of Lake Willard, at 6000 y.a., or 1000 to 1500 years after Antev's date.

What environmental changes were necessary to maintain lakes in the Estancia Basin? The basin and its drainage area receives 14 inches (356mm) of precipitation annually (Lyons 1969), and the mean annual temperature is approximately 50° F. Bachuber (1971) extimates that a temperature of about 47° F and an increase of 22 to 24 inches (558mm to 700mm) of precipitation annually would cause basin filling.

In the Llano Estacado between 5000 and 7000 B.P. an episode of drought and erosion began. Haynes (1975) suggests that there is evidence for the period of the Altithermal being warm and dry at first then warm and moist.

The shorelines in the San Augustin Basin, New Mexico (Powers 1939) show at 5000 B.P. a gradual returning to a 100 ft (30.5m) level from a low of about 50 ft (15m). The 100 ft level was reached at 3500 B.P. Minor dry periods are incicated at 2500, 1500 and 500 B.P. with eventual dessication.

PALYNOLOGICAL EVIDENCE

One of the most important challenges to Antev's interpretation of the Altithermal was from Paul S. Martin (1963). His palynological research on flood plains in southern Arizona and southwestern New Mexico deals with the pollen record left in desert grassland areas. His evidence indicates that wetter conditions than those illustrated by Antevs were associated with Altithermal erosion. Martin maintains that Altithermal conditions of dryness did not prevail in some areas of the Southwest. The period of time (8000 to 4000 B.P.) was characterized by erosion from heavy summer showers, with alluviation occurring during periods of light summer rains.

Based upon pollen evidence from 18 archeological sites in western New Mexico and eastern Arizona, Schoenwetter (1962) proposes alternating periods of heavy summer rains and light summer rains. A period of heavy summer rains ended around 5000 B.P. with light

FIG. II.7.1 Summary of Geologic Evidence

Years Ago	West Antevs (1955)	San Augustin Powers (1939)	Lake Estancia Bachuber (1971)	Llano Estacado Haynes (1975)	Rocky Mountains Bachuber (1971)	Lake Bonneville Bachuber (1971)
present			Willard Plaza Complex			
500	major drought	dry period				
1,000			minor cycles	minor cycle		
1,500	major drought	dry period				
2,000						
2,500	major drought	dry period	dessication of Lake Meinzer			
3,000						
3,500		peak of 100 ft	formation of Lake Meinzer	end of dry period	Temple Lake Stade neoglaciation	Shallow Lake sediments
4,000	Medithermal					
4,500		lake level begins to rise				
5,000				major dry period begins between 5,000-7,000 y.a.		
5,500			dessication of Lake Willard		Post-Pinedale Soil	Midvale Soil
6,000						
6,500						
7,000						
7,500	Altithermal					
8,000		lowering of lake level	formation of Lake Willard		Pinedale Glaciation	Draper Formation
8,500						

summer rains commencing until 3000 B.P. A recurrence of heavy summer rains then was prevalent until 500 B.P.

In a summary of evidence from palynological work in the Colorado Plateau, Schoenwetter and Dittert (1968) show data which from their interpretation indicate moisture conditions for the region. Data were analyzed from the Little Colorado, Arizona; San Juan River area and Chuska Valley, Northwestern New Mexico; Picuris Pueblo, New Mexico; and Sapawe in the Chama Valley, New Mexico. Data from Picuris, the closest area to White Rock Canyon with the longest record indicates conditions drier than at present occurred around 6700 B.P. (A.D. 1300) and from 400-425 B.P. (A.D. 1550-1575).

More recently, Stephen Hall (1975) in work on stratigraphy of the valley fill at Chaco Canyon, proposes a time of drought commencing at 6000 B.P. with arid conditions until 1050 B.P. when pollen evidence of the recovery of the pinyon forest indicates more moist conditions.

The reliability of palynology in reconstruction of past environments is still unsure (Potter 1962). In particular, its use in interpreting short-term environmental changes is questionable. There is also a need for taking the samples from layers that reflect the local flora. In view of lack of extensive work in the White Rock Canyon area, little palynological evidence is applicable except for general climatic tendencies.

TREE RING EVIDENCE

Since Schulman's extensive work on dendroclimatology in 1956, Harold C. Fritts has made the most significant contributions to climatalogical studies based on tree rings in western North America (Fritts 1965). Unlike Schulman, Fritts takes into account temperature variance as well as precipitation variance.

In collaboration with other authors (Fritts, Smith and Stokes 1965) Fritts determined from a statistical analysis of tree ring chronologies of pinyon pine, Douglas fir and ponderosa pine, there is a direct relationship between precipitation and ring width and an inverse relation to temperature.

On this principle, multiple correlation analyses of chronologies from trees at twenty-six stations in the North American west were undertaken. The stations were chosen according to proximity to weather stations so that checks on modern tree ring chronologies could be made with weather records. All chronologies included the years A.D. 1651 through A.D. 1920, and these years were taken as the standard. Mean and standard deviation

FIG. II.7.2 Summary of Palynological Evidence

Years Ago	Southern Arizona and Southwestern New Mexico Martin (1963)	Western New Mexico and Eastern Arizona Schoenwetter (1962)	Chaco Canyon, New Mexico Hall (1975)	Colorado Plateau Schoenwetter and Dittert (1968)
present				
500				
1,000			gradually increasing moisture	drought drought
1,500		heavy		drought
2,000		summer		
2,500		rains		
3,000				
3,500	climate essentially			
4,000	same	light		
4,500		summer rains		
5,000				
5,500				
6,000			drought	
6,500	warmer than present,	heavy		
7,000	possibly wetter,	summer		
7,500	with intense	rains		
8,000	summer rainfall			
8,500				
9,000	arid period			
9,500	much like present			
10,000				

were computed for the indices in each chronology at certain intervals. Mean indices were calculated for ten year overlapping intervals starting with year one and six of each decade. The ten year mean was then converted to a relative departure by subtracting the mean and dividing by the standard deviation of the chronology during the standard interval. The relative departures are an indication of growth, and consequently of the prevailing rainfall and temperature for thirteen months, June through June. A positive departure indicates a moist climate or high precipitation and low temperature, and a negative departure indicates dry climate or low precipitation and high temperature. Early chronologies are subject to greater error because of smaller sample sizes (Fritts 1965).

The chronology for Mesa Verde begins in 735 A.D. and from the upper Rio Grande in 911 A.D. The long dry periods (less than or equal to three intervals) are noted from the table of relative departures:

Mesa Verde, Colorado

A.D. 751-785
816-850
866-895
1081-1110
1126-1160
1211-1235
1241-1265
1271-1305 (1271-1285, severe)
1391-1410 (1396-1405, severe)
1411-1425
1431-1480
1531-1550
1561-1605 (1576-1590, severe)

Upper Rio Grande, New Mexico

A.D. 911-930
966-1020
1036-1060
1071-1105
1126-1165
1206-1230
1246-1300 (1280-1285, severe)
1321-1345
1411-1430
1436-1465
1466-1485 (1471-1480, severe)
1556-1595

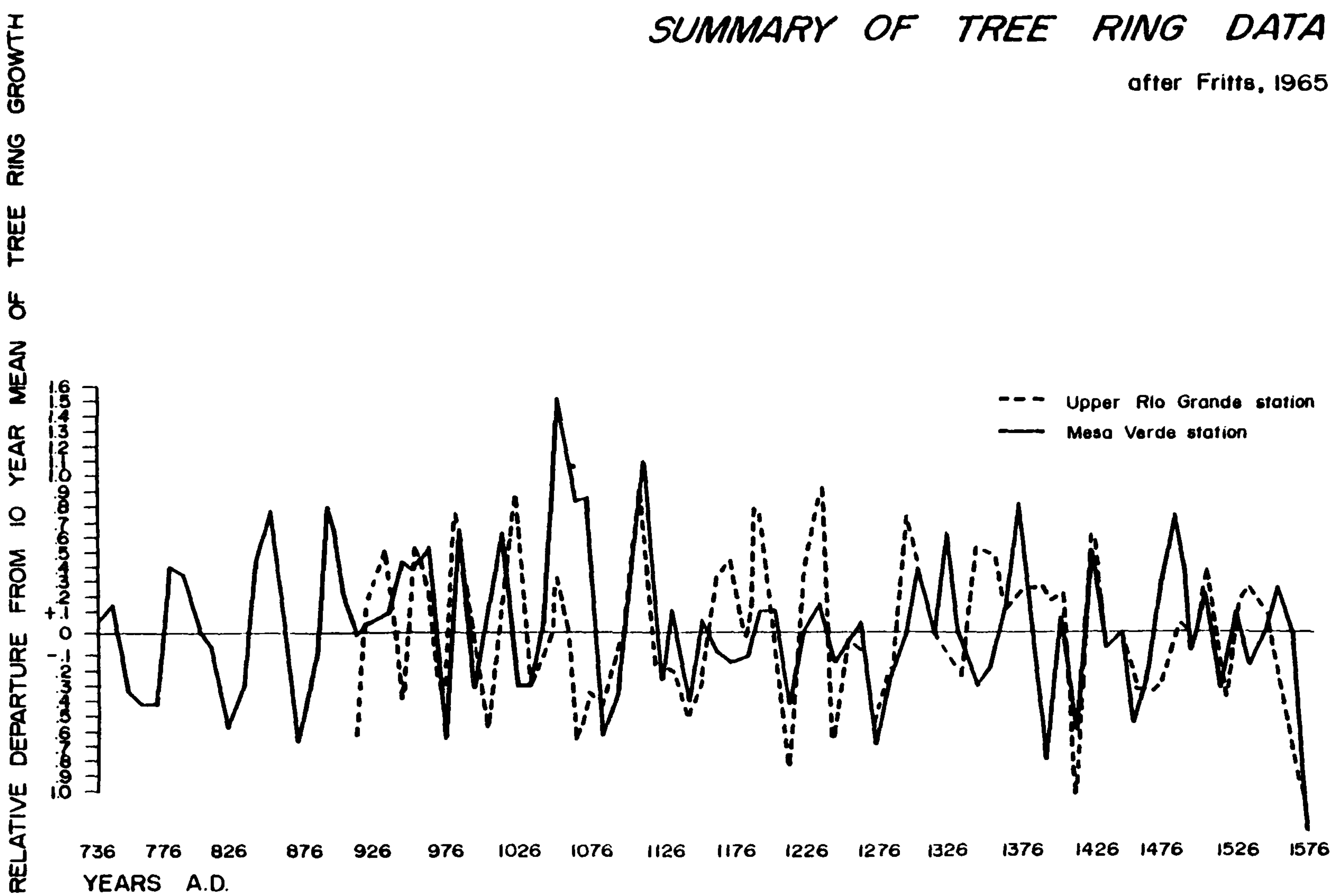


FIG. II.7.3 Summary of Tree Ring Evidence ten year means of growth indices converted to relative departures. Plus (+) indicate high precipitation and low temperature. Minus ( ) departures indicate low precipitation and high temperature.

II.7 PALEOCLIMATIC VARIABILITY IN THE NORTH-MIDDLE RIO GRANDE

Fritts, Smith and Stokes (1965) analyzed 15 cores from an 800 year old Douglas fir tree (1210-1963) at Mesa Verde and 21 other tree rings from an archeological series (A.D. 435-1236) and concluded that there were ten other droughts at Mesa Verde between A.D. 435 and A.D.1670 more severe in magnitude and length than the drought of A.D.1276-1289. These droughts occurred at A.D. 517, 565, 614, 844, 884, 1170, 1402, 1525, 1585 and 1670.

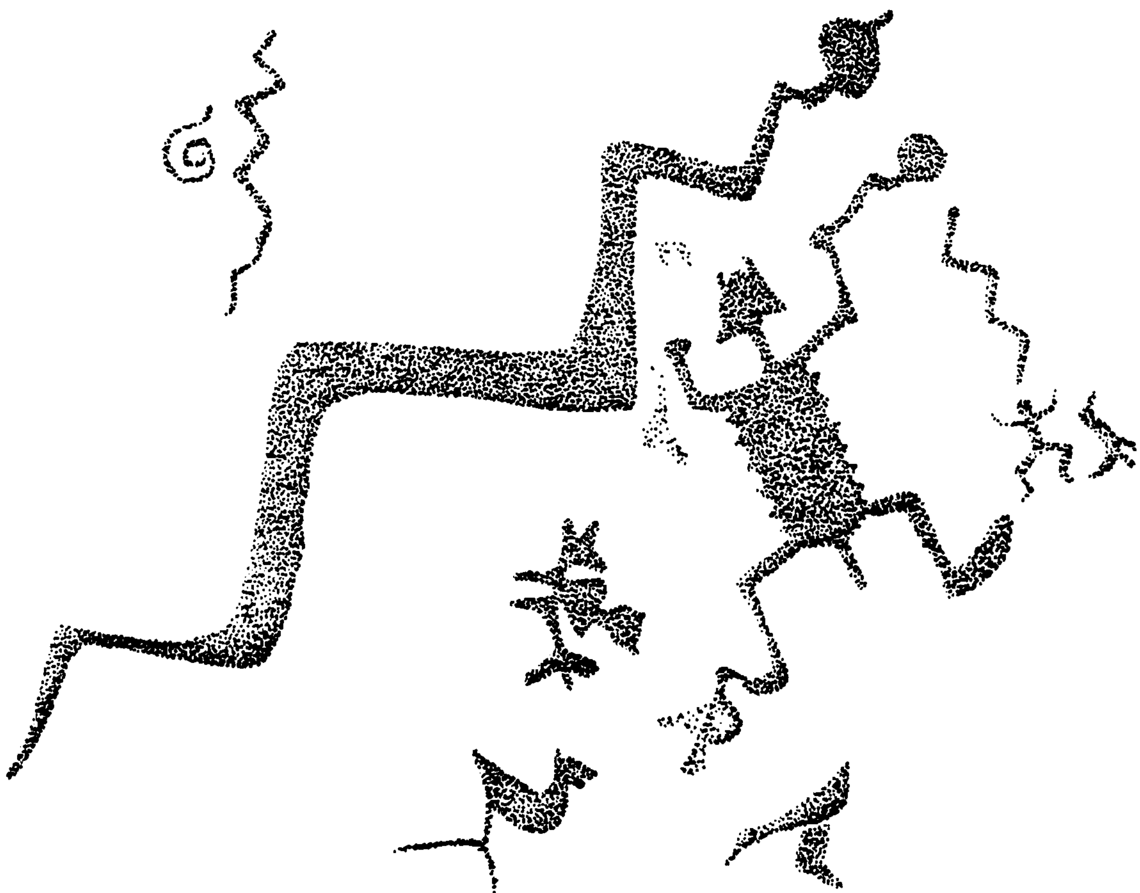
It is clear that tree ring evidence is the most satisfactory single technique for determining short-term climatic change (high precipitation and low temperature vs. low precipitation and high temperature) and is especially valuable because the changes can be dated precisely. However, sample size is important in estimating the reliability of information. The farther back in time information is sought, the less likely a suitable number and range of samples are available.

IMPLICATIONS OF DATA FOR NORTH-MIDDLE RIO GRANDE

Since no paleoclimatic work has been done in the immediate White Rock Canyon area, any generalizations about climatic change in the north-middle Rio Grande must rely upon information gathered from other parts of New Mexico and the Southwest. Recently, a palynological work was done at Arroyo Hondo near Santa Fe, New Mexico, by Vorsila Bohrer. Information from this work has not been published.

However, one can assume that the White Rock Canyon area followed trends apparent everywhere in the Southwest during post-pluvial times. Geologic evidence indicates that between 8000 and 4000 B.P. the climate was at least warmer than at present and in some areas, drier. From 4000 B.P. to 3500 B.P. more mesic conditions prevailed in most of the west. This condition ended 3500 to 2500 B.P. with a dry period, followed by cyclical periods of drought. Tree ring evidence provides information on drought in the Mesa Verde area and Upper Rio Grande area. Peaks of drought conditions occurred at A.D. 517, 565, 614, 844, 884, 1170, 1402, 1525, 1580, and 1670. These droughts may have affected the White Rock Canyon area by reducing the actual precipitation and runoff water from higher elevations of the Jemez Mountains.

There is no evidence indicating any major climatic changes in the last 5000 years in White Rock Canyon or in the Southwest. Thus there is no reason to conclude that major changes in vegetation have occurred. The survey area includes terrain with rapid changes in elevation and slope, extremes of exposure and water availability. The diversity of plant life at present (Tierney, this volume) reflects the diversity of available habitat as it no doubt did in the past.



SECTION III: CULTURAL RESOURCES IN THE COCHITI STUDY AREA

III.1
Previous Anthropological Research in the Cochiti Study Area

JAN V. BIELLA

INTRODUCTION

Portions of the Cochiti study area have been the focus of relatively continuous anthropological research since the late 19th century. Although much of this work was conducted over 50 years ago, under different theoretical biases and with different techniques of data recovery available, the information inherent in this research has the potential to form a basis for an investigation into problems of current anthropological interest. In arguing the polemic for scientific procedures in archeological research, this potential has often been overlooked or dismissed. While the information collected previously may be inconsistent or incomplete when judged by current needs, it is imperative that researchers carefully evaluate the nature of previous research before dismissing it as useless.

During the present project, an extensive search of the archeological and anthropological literature in the study area, both published and unpublished, was undertaken. This resulted in a documentation of nearly 1000 sites, which spanned a period from roughly 2000 B.C. to the present. This chapter will summarize the character of previous research in the Cochiti study area. This discussion will include a description of known cultural resources, a listing of the previous researchers, their geographic areas of interest and any overt biases in data collection or description.

The information presented in this chapter was originally funded by the National Park Service as a portion of an archeological assessment of cultural resources in Cochiti Reservoir, Department of Interior Contract No. CX700050323, (UNM Proposal No. 101-82), and has been reported previously (Biella and Chapman 1975). Although recent survey and excavation, predominantly in Bandelier National Monument, have been conducted, the data presented in this chapter are current only to May, 1975.

PREVIOUS RESEARCH IN THE COCHITI STUDY AREA

Since the late 19th century, portions of the Cochiti study area have been the focus of relatively continuous anthropological and archeological investigation. Researchers in the area have included Adolf Bandelier, Charles F. Lummis, Edgar L. Hewett, Nels C. Nelson, H. P. Mera, Leslie White, Ruth Benedict and Charles Lange. General summaries of this research may be found in Dickson (1975), Ellis (1967), Flynn and Judge (1973), Hewett (1905; 1953), Kidder (1924), Lange (1959), McGregor (1965), Wendorf (1954), Wendorf and Reed (1955) and Willey (1966). The majority of these summaries are based upon research conducted in the Pajarito Plateau and Bandelier National Monument areas. In more recent years, the areas of investigation have extended southward to Cochiti Pueblo and the Santa Fe River.

The first well documented anthropological reconnaissance in the study area was conducted by Adolf Bandelier between 1880-1882 (Bandelier 1892; Lange and Riley 1966). He visited and sketched major archeological ruins in Pajarito Plateau, including Kuapa, Shrine of the Stone Lions, Old Kotyiti and Potrero Viejo. Other early work included Charles Lummis' documentation of some Keres migration myths in "The Wanderings of Cochiti" (Hewett 1953:4).

The first major excavations and extensive testing programs in the study area were conducted by Edgar L. Hewett at Tyuonyi, El Rito de los Frijoles, Sankewi'i and Tshirege (Hewett 1909a; 1909b). Nels C. Nelson completely excavated Old Kotyiti, a Pueblo Revolt period site, and tested Kuapa, Pueblo Canada and Stone Lions of the Potrero de los Idolos (Wissler 1915).

Although excavations continued during the next two decades (Hendron 1940), archeological research centered upon defining more accurately a temporal and cultural chronology for the middle Rio Grande. H. P. Mera's extensive ceramic work and archeological surveys (1934; 1940) are prime examples of this kind of research. Tree-ring samples from numerous sites were also collected during this period (Robinson 1972).

Concurrent with this archeological research were a series of finite ethnographic studies. These included notes on Cochiti Pueblo by Father Noel Dumarest (1919), an analysis of Cochiti social and ceremonial organization (Goldfrank 1927), a comparative study of Keresan medicine societies (White 1930) and a collection of Cochiti tales (Benedict 1931). This was later supplemented by an extensive ethnography of the Cochiti by Charles Lange (1959).

More recent archeological research conducted in the study area was stimulated by the need to "salvage" information from sites which were being destroyed by the development of the Los Alamos Scientific Laboratory (LASL) complex in the Pajarito Plateau and the U. S. Army Corps of Engineers' Cochiti Dam and Reservoir Project near Cochiti Pueblo. Work for LASL has included both survey and excavation from Frijoles Canyon north to Los Alamos Canyon in the study area. Investigations began at the end of World War II and have continued to present (Worman 1967; Steen 1974). Research in the vicinity of Cochiti Pueblo has centered upon construction areas for Cochiti Dam, its spillway, outlet works and conveyance channel. This work was conducted primarily between 1962-1967 and has included both survey and partial and complete excavations (Lange 1968; Peckham 1966; Peckham and Wells 1967; Snow 1971; 1972a;

1973b; 1973c; Schaafsma 1975).

Additional survey and limited excavations in areas adjacent to Cochiti Dam were conducted between 1970 and 1973. These included survey and testing in areas leased for the construction of the town of Cochiti Lake (Snow 1970) and a survey of the proposed roadway for the Tetilla Peak Recreation area (Snow 1973a).

Other work not directly related to the dam construction includes excavation of Rainbow House (Caywood 1966) and Saltbush Pueblo (Snow 1974) in Bandelier National Monument and periodic survey and testing in the Canada de Cochiti Grant between 1958 and 1970 (Lange 1958; 1961; Frisbie, Moore and Spielbauer 1970). In 1973, an assessment of the grant was conducted by personnel from the University of New Mexico which entailed an intensive survey of eastern portions of the grant (Flynn and Judge 1973).

Trends in Previous Research

Much of this previous research has centered upon defining cultural sequences and cultural trait inventories for the general Pajarito Plateau-Cochiti areas (Hewett 1953; Wissler 1915; Kidder 1924). Some researchers have attempted to define boundaries of the cultural areas represented in the middle Rio Grande (Mera 1940; Hewett 1953). Others have focused upon an examination of the relationship between the prehistory of the Rio Grande and the Four Corners area, in particular the possible migrations of the Chacoan and Mesa Verdean peoples in light of the linguistic distributions of modern pueblos (Ellis 1967; Reed 1949; Wendorf 1954; Fox 1967). With the exception of Dickson's study (1975), however, no questions of a processual nature have been formally addressed to explain the character and distribution of sites in the study area.

Taken as a whole, the previous research has resulted in a formidable amount of information concerning cultural resources in the study area. This information is spotty, however. Some areas such as the Pajarito Plateau and Canada de Cochiti Grant have been the focus of more intensive research than other areas. Even in these *areas, the quality of information is inconsistent.*

Perhaps the major bias interjected by previous researchers has been a focus upon Anasazi Period sites, especially the large spectacular ruins on the Pajarito Plateau. This bias has been lessened in recent years, but most PaleoIndian and Archaic Period sites, for example, have been ignored and remain poorly represented in previous research of the study area. A few sites of the 17th and 18th centuries have been investigated (Bandelier 1892; Wissler 1915; Wendorf 1954; Bussey 1971; Snow 1973d) but the more recent historic sites have generally been ignored.

Biases have also been introduced thr [illegible] generally unsystematic manner in which sites [illegible] located. Intensive field survey techniques w [illegible] t only in documentation of the location o [illegible] the specification of land areas where sit [illegible] ave not generally been conducted by [illegible] ntil recently. Within the study area, on [illegible] 1970), Flynn and Judge (1973) and McNeece (Snow 1972a) conducted surveys with the intent of inventorying cultural resources through intensive foot surveys. The remaining surveys in the study area were extensive rather than intensive, in the sense that it is not known exactly where surveys were conducted or whether *all* cultural resources were documented.

From previous research, both published and unpublished, 954 sites with 1208 period components (e.g., Archaic, Anasazi, Historic, etc.) have been recorded in the Cochiti study area. A brief summary of each site which includes site number, period, phase, elevation, drainage basin, vegetative community and site description appears in tables appended to this chapter.

DESCRIPTION OF CULTURAL RESOURCES IN THE COCHITI STUDY AREA

In view of the magnitude of the area to be reviewed and the extent of its environmental heterogeneity, the study area has been divided into five "districts" which reflect major geologic or physiographic features. These are the Pajarito Plateau, Cerros del Rio Plateau, White Rock Canyon, lands along the Rio Grande below the mouth of White Rock Canyon (Cochiti District) and La Bajada scarp-Santa Fe River areas. Within each of these districts the cultural resources have been ordered by drainage basin (after Brakenridge, this volume). Districts and drainage basins have been selected as units of observation since much of the environmental information presented in the previous section has been organized in a similar fashion. Thus the districts and basins have the potential to serve as a common unit of analysis against which variability in cultural and environmental content may be examined.

Pajarito Plateau District

Of the five districts, the Pajarito Plateau is the largest and has been the focus of the majority of previous research, resulting in a documentation of over 710 archeological sites. This district encompasses the greatest geological, ecological and archeological complexity and diversity. Within the boundaries for the study area, eighteen drainages dissect the plateau into high narrow mesas and deep canyons with relief often 200m above the valley floors. With the exception of the Rio Grande and Santa Fe Rivers, the water supply indices for drainages within the Pajarito Plateau, both spring and summer, are the highest in the study area. All three life zones and eleven vegetative communities defined for the study area occur on the Pajarito Plateau. Faunal diversity is similarly high. Arable land classes are distributed in small discontinuous units with Class 1 and 2 lands located primarily on the mesa tops.

1. Bland Canyon

Bland is the most southerly drainage basin within the Pajarito Plateau. As it approaches the Rio Grande its valley widens. Only in its upper reaches is it physiographically similar to the other narrow mesas and deep canyons of the plateau. Bland is one of the larger drainage systems within both the Pajarito Plateau and the study area; it encompasses 53.6 square kilometers. Within the study area, Bland lies entirely with the Upper Sonoran and Transition Life Zones. Seven vegetative communities are present. Of these 51.8% of the land area lies in the juniper community and 35.8% of the land area lies in the ponderosa community. Bland has the highest spring and summer water supply index in the Pajarito District.

Most of the previous research in Bland Canyon stems

from several extensive surveys and limited testing programs conducted under the direction of Charles Lange for Southern Illinois University (SIU) between 1957 and 1960 (Lange 1958; 1961), and between 1969 and 1970 (Frisbie, Moore and Speilbauer 1970). Additional information was recovered from an intensive survey by Snow in 1970 for the Museum of New Mexico (Snow 1970) and an intensive foot survey by Flynn in 1973 (Flynn and Judge 1973). The majority of this research was conducted in the lower part of the canyon where the valley broadens within the Canada de Cochiti Grant and the northern portion of the Pueblo de Cochiti. Up canyon from that area, no survey or excavations have been conducted.

Seventy-nine sites have been located in Bland Canyon with 80 period components. Of these, three (3.8%) are PaleoIndian Period sites; five (6.3%) are Archaic sites; eight (10%) are Lithic Unknown sites; 57 (71.3%) are Anasazi sites; seven sites (8.8%) could not be assigned to a temporal/cultural period. No Basketmaker or Historic Period sites have been documented in Bland Canyon. The lithic sites taken as a unit (PaleoIndian, Archaic and Lithic Unknown) occur in the juniper vegetative community. Only one lithic site (Lithic Unknown) was distinguished by the presence of hearths. No other information about the character of other lithic sites or their assemblages was available. For the Anasazi Period sites no early Developmental (P-I, P-II) sites were documented. Thirty-six P-III sites (56.3%) and 28 P-IV sites (43.7%) were described. The P-III sites varied from 1 to 18 rooms and the P-IV sites varied from 1 to 3 rooms with one 150 room P-III/P-IV pueblo noted. Both the P-III and P-IV component sites are located predominantly within the juniper community.

2. *Rio Chiquito*

Rio Chiquito lies north of Bland Canyon and although somewhat smaller (35.3 square kilometers) shares similar physiographic characteristics with Bland. In its upper reaches, it is a narrow steep canyon with its valley floor opening toward White Rock Canyon. Rio Chiquito intersects Bland approximately 1.6km from the Rio Grande and lies largely within the Upper Sonoran Life Zone. Juniper is the dominant community; it covers 54.9% of the land area followed by scrub oak which covers 15.3% of the land area (see Drager and Loose).

Previous research in Rio Chiquito has been conducted by Nels C. Nelson (Wissler 1915) who excavated Old Kotyiti and tested several sites including Kuapa. Extensive surveys were undertaken by Lange (1957-1960) and Moore and Spielbauer (1969-1970) with an intensive survey by Flynn (1973). The area east of the Dome road in the Canada de Cochiti Grant, west of the Rio Grande has been intensively surveyed. The western part of the grant has been intensively surveyed, in part, to Horn Mesa. The remaining areas farther west and north have not been surveyed. Summaries of this work may be found in the Museum of New Mexico survey files and in manuscripts by Lange (1958; 1961) and Flynn and Judge (1973). One hundred ninety-eight sites with 252 period components have been documented for the Rio Chiquito Drainage. One site (0.4%) is Archaic; seven sites (3.2%) are Lithic Unknown; one site (0.4%) is Basketmaker II; 157 (62.3%) are Anasazi; 61 (24.2%) are Historic; 24 (9.5%) are of an unknown period.

For the lithic sites, no information is available about the character of their assemblages or the distribution of the artifacts with respect to any features. The single Basketmaker II site is characterized by hearths with an associated scatter of debitage. No Basketmaker III or P-I sites (early Developmental Period) are known for the Rio Chiquito drainage. Three P-II sites have been recorded. These are small sites, with lithic and ceramic scatters and possibly a structure, suggesting seasonal use.

Ninety P-III (Coalition) sites have been noted for the Rio Chiquito. These range from 1-2 room sites to sites of over 50 rooms. Of the 91 P-IV (Classic) sites, over twenty are small 1-2 room pueblos. While a few P-IV exhibit more rooms, these are generally multicomponent P-III/P-IV sites. Several terraces, shelters and small open sites date to the P-IV phase. Three large P-IV sites, which range from 150 to over 800 rooms have been recorded.

Of the 61 Historic Period sites, 46 have been attributed to P-V, or Historic Pueblo. These include components in two of the large P-IV sites. Room count variability of the historic sites is similar to P-III. Shelters and terraces are also noted for P-V. Other historic sites include the Spanish town of Canada and Old Kotyiti, a Pueblo Revolt site. The majority of all sites, regardless of period, are located in the juniper community.

3. Sanchez and Medio

Sanchez and Medio Canyons have relatively small drainage basin areas, 19.4 and 16.0 square kilometers, respectively. Both mark the beginning of the Pajarito Plateau canyons which remain narrow and steep to their confluence with the Rio Grande in White Rock Canyon. Both include the Upper Sonoran and Transition Life Zones with seven biotic communities represented in each. The areally dominant vegetative communities in Sanchez Canyon are ponderosa (53.4%) and juniper (25.3%) and in Medio Canyon are juniper (51.2%) and pinyon-juniper (30.4%).

Previous research in Sanchez Canyon stems from two surveys, Moore and Spielbauer (1969-1970) and Flynn (1973). Both surveyed lands only within the Canada de Cochiti Grant and together approximate an intensive survey for the portions of Sanchez Canyon in the grant. Outside the grant, no survey work has been conducted. Previous research for Medio Canyon includes the same two surveys for the portions of Medio Canyon in the grant. Survey north of the grant in Medio was conducted by Lange (1957-1960). Lange's survey covered portions of the canyon in an extensive, rather than intensive manner. His interests during this survey were in documenting and verifying the locations of archeological sites noted during a topographic survey (Peckham and Wells 1967).

Twenty-seven sites have been located in Sanchez Canyon. Of these, 13 (48.1%) are Anasazi Period sites, two (7.4%) are Historic sites and 12 (44.4%) are of an unknown period. No lithic or Basketmaker sites have been located. Of the Anasazi Period sites, one (6.9%) is P-II, three (20.0%) are P-III and 11 (73.3%) are P-IV. One 100 room pueblo which spans P-III/P-IV phases has been recorded. The extent of either the P-III or P-IV occupation at this site is not known. The other sites range from 1-6 rooms in extent, with the most site size variability found in the P-IV sites. Two terraces have been attributed to the P-IV phase. The historic sites include sheep pens and isolated walls. The undated sites include

petroglyphs, rock shelters, terraces and isolated masonry rooms. The majority of these sites are located in the pinyon-juniper community.

Twenty-two sites have been located in Medio Canyon. Of these, 14 (58.3%) are Anasazi; five (20.8%) are Historic and five (20.8%) are of unknown period. No lithic or Basketmaker sites were located in the canyon. For the Anasazi Period, five P-III sites and 10 P-IV sites have been recorded. The P-III sites range from 1-3 rooms in extent. Six of the P-IV sites range from 1-3 rooms with one P-IV shelter. One large site, San Miguel, dates solely to early P-IV (ca. A.D. 1325-1450). The Historic sites include two shelters and one 2-3 room site. Two multicomponent Anasazi-Historic open camp sites have also been located. Most sites are located in the juniper vegetative community.

4. Capulin

Capulin is the largest canyon system (48.2 square kilometers) of the Pajarito Plateau District within the study area. All three life zones (Upper Sonoran, Transition and Canadian) are represented with nine of the eleven vegetative communities present. Ponderosa is the dominant community covering 36.1% of the total land area with pinyon-juniper next covering 20.4%. Previous research in Capulin Canyon is extremely limited. Only nine sites have been located. With the exception of one site at the mouth of Capulin which was located by Moore and Spielbauer in 1970, all other sites were located by Lange between 1957-1960. On Lange's survey surface collections were made, but no site descriptions have been filed with the Museum of New Mexico. Temporal phases were assigned to those sites based on ceramic counts made from the collections.

Of the nine sites located, six have Anasazi components and three cannot be dated. For the Anasazi Period, four (40%) P-III sites and six (60%) P-IV sites have been recorded. No other information is available on these sites.

5. Alamo

Alamo Canyon is similar to Medio and Sanchez Canyons in size (17.8 square kilometers). It encompasses two life zones, Upper Sonoran and Transition and is a highly diverse canyon with eight vegetative communities present. The riparian community, while covering only 2.6% of the land area, extends closer to White Rock Canyon and the Rio Grande than is true of most of the other Pajarito canyons. Ponderosa, however, is the dominant community (51.8%). Of the 12 sites recorded in Alamo, 10 have been recently documented by the National Park Service (NPS) as part of a contract program in conjunction with the development of Cochiti Reservoir. The focus of NPS's work has been to locate and then excavate sites lying within the flood control pool (5460.5 ft contour). Survey has been conducted outside the flood pool, but the thrust of the work has been on sites at the mouth of Alamo Canyon. Since this work began only recently, the information summarized below stems from NPS survey forms filed with the Museum of New Mexico. More complete information should be forthcoming. The upper reaches of Alamo Canyon have not been surveyed.

Of the 12 sites located within Alamo Canyon, seven (43.8%) are Anasazi sites; four (25.0%) belong to the Historic Period and five (31.8%) cannot be assigned temporal affiliation. No lithic or Basketmaker sites have been located. Of the Anasazi sites, two may be considered P-III and five P-IV. One 20 room P-III site has been recorded. One large P-III/P-IV site, Pueblo of the Stone Lions, is located approximately 2.5km from the mouth of Alamo Canyon. The other sites are generally small and include a single one-room P-IV site, one 4-10 room P-IV site and several shelters, shrines (?) and lithic and ceramic scatters. The Historic sites include sheep pens and modern trash. These sites are located primarily in the Upper Sonoran Arid and Pinyon communities.

6. Lummis

Lummis is similar to Alamo Canyon in size (17.7 square kilometers). It encompasses both the Upper Sonoran and Transition Life Zones with seven vegetative communities present. Ponderosa is the most dominant community at 29.7% of the land area. Sixty-eight sites have been located in Lummis Canyon. With the exception of a few sites located by NPS connected with the work conducted in Alamo Canyon, all the remaining sites were located by Lange between 1957 and 1960. As such, the only information available for most of these sites concerns site location and temporal period. Of the 68 sites located, 64 (94.1%) belong to the Anasazi Period and four are of unknown period. Of the dated Anasazi, five (6.8%) are P-II, 56 (76.7%) P-III and 12 (16.3%) P-IV. Of the P-III sites with descriptive information, four are 1-3 room pueblos; one is a 10-12 room pueblo, and one P-III/P-IV site is described as a small village. The sites appear to be distributed relatively evenly in the pinyon, pinyon-juniper and ponderosa communities. No other information is available.

7. Rito de los Frijoles

The Rito de los Frijoles drainage basin encompasses 28.3 square kilometers within the study area. The Upper Sonoran and Transition Life Zones are represented with seven vegetative communities present. The ponderosa community vastly dominates the area (79.8%). The lower 8km of Frijoles Canyon has been the most intensively investigated. In this area, the flood plain in the bottom of the canyon does not exceed 200m in width and the stream is perennial. Much of the work in the area results from the extensive excavations of Tyuonyi and El Rito de los Frijoles by Hewett (1909a; 1909b; 1953). Hendron (1940) also published on El Rito de los Frijoles. Caywood (1966) published on excavations at Rainbow House. Other information stems from Lange's survey of 1957-1960. The information summarized in Appendix III.1A was derived largely from the Museum of New Mexico files and does not reflect the complexity of intensity of the prehistoric occupation:

> Some of the largest and most important sites in the area are not recorded in the current files of the Museum of New Mexico. This is the result of a historical accident. The Museum of New Mexico and School of American Research, under the direction of Dr. Edgar L. Hewett, conducted extensive archaeological excavations in the Pajarito Plateau region during the first third of the twentieth century. Although some excavations, and records of both are scanty or non-existent. As a matter of professional protocol the Laboratory of Anthropology ... carried out little or no field work in the Pajarito region. What surveys they made were

scattered and not intensive (Peckham and Wells 1967:5).

In general, the ruins of the Rito consist of four community houses in the valley and one on the mesa rim near the southern edge of the canyon. A series of cliff houses extend for a distance of ca. 1.5km. Thirteen talus villages have been identified and tested. The occupation of the Rito dates from late 12th century to the Historic Period (Hewett 1953:97). The largest site is Tyuonyi which may have accommodated a maximum population of 500 individuals at one time (Hewett 1953:97). These larger sites date predominantly late 14th century to early 16th century (Robinson 1972).

8. The Northern Canyons: Chaquehui, Ancho, Water, Potrillo, Three Mile and Cedro Canyons, Pajarito, Canada del Buey, Mortandad, Sandia and Los Alamos

The remaining canyons of the Pajarito, although differing in size, are similar in physiographic conformation and in the character of previous research. Archeological sites have been recorded by Dr. Frederick C. V. Worman, Larry Hammack and Charlie Steen of the University of California, Los Alamos Scientific Laboratory (LASL). Worman's work was a follow up to a topographic study of Los Alamos County. He only recorded site location and dimensions in the records given to the Museum of New Mexico. Hammack's and Steen's records which were given to the Museum are more complete. In fact, Steen resurveyed and relocated a number of Worman's sites. All these surveys were extensive rather than intensive and appear to have favored the Anasazi Period sites. In addition to survey, both Worman and Steen have excavated some sites in the area. One report (Worman 1967) summarizes three sites which were excavated on the Mesita del Buey. Other reports are forthcoming (Steen 1974).

a. Chaquehui

Chaquehui is a small canyon system (4.4 square kilometers) which lies in both the Upper Sonoran and Transition zones. Five communities are represented with pinyon dominating (67.5%). Only five sites have been located in the Chaquehui drainage basin. Three of these are P-III Anasazi sites and two are of unknown period. Of the P-III sites with descriptive information, one is a 6-10 room pueblo and the other is a medium-sized pueblo of ca. 10-30 rooms.

b. Ancho

Ancho drainage basin encompasses 18.1 square kilometers with seven vegetative communities distributed in both the Upper Sonoran and Transition Life Zones. The pinyon (33.4%) and ponderosa (43.6%) communities both dominate the area. Fifty-two sites have been located in Ancho Canyon. Twenty-nine are Anasazi Period sites. For these with dates, 20 are P-III and seven are P-IV. An additional 23 sites are of unknown period. For those sites with descriptive information, the P-III sites range from small pueblos of several rooms to pueblos of 12-15 rooms, to "large" pueblos. The P-IV sites are generally smaller; no large P-IV sites have been recorded. The size of undated sites ranges from one to 20 rooms in extent.

c. Water

Water Canyon encompasses 30.4 square kilometers. Seven vegetative communities crosscut the Upper Sonoran and Transition Life Zones which lie in this drainage basin. Of these communities, the ponderosa dominated 48.4% of the land area. Thirty-seven sites have been located in Water Canyon. Seventeen of these are Anasazi Period sites and 20 cannot be assigned to a temporal period. Of the 17 Anasazi sites, 15 exhibit P-III components. These sites range from small sites of one room to sites of 75-100 rooms. The majority of these cluster between 10-30 rooms. The unknown period sites range from small to large sites. Other undated sites include petroglyphs and torreon-like structures.

d. Potrillo

Potrillo is another small drainage of 4.7 square kilometers and is similar in size to Chaquehui. Five vegetative communities are represented in two life zones (Upper Sonoran and Transition). Ponderosa (54.9%) and juniper grassland (32.6%) are the dominant communities. Thirty-two sites have been located in Potrillo, 14 of which date to the Anasazi Period. Only five sites can be assigned to a phase; all are P-III. The remaining 18 sites cannot be assigned to a temporal period. Of the sites that have descriptions, two are small sites of 1-4 rooms, two are medium-sized pueblos and one is a large pueblo. For the other Anasazi sites for which no phase could be assigned, the sites distribute in a similar fashion but in higher frequency. Three large and three medium-sized sites fall into this class. Three additional large, four medium and two small sites fall within the unknown class.

e. Three Mile and Cedro Canyons

Three Mile and Cedro Canyons are small, encompassing 7.3 square kilometers. They exhibit little vegetative diversity with only two vegetative communities in each life zone being represented. In Cedro Canyon pinyon (85.0%) dominates and in Three Mile ponderosa (75.0%) dominates. Only six sites have been located in these canyons. Of these, three are Anasazi (two are P-III and one cannot be assigned to a phase) and the other three are of unknown period. The P-III sites range from a small site with a single mound to a site with eight distinct mounds of four to eight rooms each. One large Anasazi site with no phase designation has been recorded. The unknown sites include one with a torreon-like structure.

f. Pajarito

Pajarito encloses an area of 23.8 square kilometers with five vegetative communities represented. Ponderosa is the dominant community (64.8%) although the majority of the 49 known sites are located in the pinyon (27.2%) community. Twenty-nine date to the Anasazi Period including one (4.8%) P-II, 16 (76.2%) P-III and three (14.3%) P-IV phase sites. One (4.8%) Historic P-V site was noted. Nineteen sites could not be assigned temporal affiliation. The majority of the P-III sites were medium in size and ranged from 8-30 room pueblos. One 40 room P-II/P-III site was noted. Another multicomponent Anasazi site was LA 170, a 500 room P-III to P-V pueblo. Other sites which belong to the Anasazi Period, for which no phase could be assigned included five medium-sized pueblos and three large pueblos.

g. Canada del Buey

Canada del Buey is a relataively small canyon of 8.9 square kilometers. Three vegetative communities, dominated by pinyon (60.7%), in the Upper Sonoran and Transition Life Zones, occur in the canyon. Twenty-

eight sites have been located in this canyon, three of which have been excavated and reported by Worman (1967). The temporal distribution includes one Basketmaker site, 15 Anasazi sites and 12 sites of an unknown period. For the Basketmaker site, no information beyond period and site size was available. The P-III sites ranged from two 5-8 room pueblos to three 8-12 room pueblos to two pueblos of 15-20 rooms. No information on the character of the single P-IV site was available. No large sites were noted for this canyon.

h. Mortandad

Mortandad is a canyon in the Pajarito that encompasses 13.4 square kilometers. Five vegetative communities are represented with pinyon (52.2%) and ponderosa (33.3%) the dominant communities. Twenty sites have been located in Mortandad Canyon and of these 16 (80%) are Anasazi Period sites and four (20%) are of unknown period. One site had a component which could be assigned to the P-II phase, seven others to P-III and one to P-IV phase. With the exception of a single one room site of unknown temporal affiliation, no other small sites have been located in the canyon. The majority of the P-III sites are 15-20 room pueblos; one P-II/P-III site of 200 rooms was recorded. P-IV sites are medium-sized pueblos of 25-30 and 40-45 estimated rooms. P-IV sites of this size are unusual for the Pajarito and the study area as a whole.

i. Sandia

Sandia (15.5 square kilometers) is slightly larger than Mortandad Canyon. Its vegetative diversity is similar with four communities and pinyon (54.1%) and ponderosa (24.8%) dominant. Sixteen sites have been located in Sandia. Eleven of these are Anasazi Period sites; one is a Historic Period site; four sites could not be assigned a temporal phase, six were P-III and one P-IV. Of the three large sites noted in the canyon, one dates to P-III; the other two were assigned to the Anasazi Period, but no phase could be determined. The other three P-III sites ranged from 2-8 rooms in extent. No information about the size of the single P-IV site was available. The Historic site consisted of isolated walls.

j. Los Alamos

Los Alamos is a large canyon, but only 14.6 square kilometers lie within the study area boundaries with four vegetative communities represented. Pinyon (31.7%) and juniper grassland (29.6%) are dominant. Only 15 sites have been located in the part of the canyon that is within the study area. Of these, 12 are Anasazi Period sites; one is Historic Period; two sites are of unknown period. Variation in the size of sites ranges from two large sites (one a multicomponent P-III/P-IV site and the other Anasazi Period with no phase designation) to a 50 room P-IV/P-V site to several 10-20 room P-III sites to a P-III ceramic scatter.

9. Summary of Pajarito District

The extent and the intensity of previous research in the Pajarito Plateau differs between canyon systems. El Rito de los Frijoles, Rio Chiquito and Bland Canyon have been the focus of the most intensive research. For the Rito, this intensity has been expressed in extensive excavations of some of the major ruins in the valley of the canyon. Although other smaller sites were noted near the Rito, little attention was afforded them. In the Rio Chiquito and Bland Canyons, little testing or excavation has been conducted, but portions of these canyons in the Canada de Cochiti Grant have been intensively surveyed. All other areas in the Pajarito have been surveyed extensively in some areas, but often little information beyond the site location, site dimensions and, perhaps, cultural and temporal affiliation have been recorded. Most of this extensive research has been survey work with a few excavations.

Of 710 sites located in the Pajarito District, only 25 have lithic components. Three are potentially PaleoIndian sites; six may be Archaic sites; one may be a Basketmaker II site, and 16 are lithic sites to which a temporal period cannot be assigned. Lithic sites in the Pajarito District have only been located in Bland and Rio Chiquito drainage systems; they are distributed solely within the juniper and juniper grassland communities. The distribution of the lithic sites in these southern drainages may not reflect the selection of particular community situations but rather biases in data collection. Much of the focus of the early researchers was on the large structural Anasazi sites. These sites are not as ephemeral as lithic sites which may easily be missed by extensive, rather than intensive, surveys. Thus, the distribution of lithic sites only in the southern drainages which are dominated by the juniper communities may be a result of a sampling error. Aside from an occasional comment that some sites may exhibit differential selection of materials (e.g. obsidian on some sites may approach 90% of the total assemblage, and other sites may be 75% basalt, etc.), little information is available on the characteristics and content of the lithic assemblages. Consequently, little can be suggested about the context of distribution of the lithic sites in the southern Pajarito Plateau.

Few sites of the Developmental (BM-III, P-I, P-II) A.D. 600-1200 (Wendorf 1954), have been located in the Pajarito Plateau District. One possible Basketmaker site (BM-III?) has been located in Canada del Buey. No information about the nature of this site is available. No P-I sites and only 15 P-II sites have been recorded. With one exception, all of the P-II components have later P-III components associated. Since none of these sites has been excavated, the extent of the P-II occupation in the Pajarito is not known. These sites range from one room sites with associated lithic and ceramic scatters, to a series of masonry shelters to 60-70 to 200 room pueblos. Although the P-II site density for this region is low, it is consistent with the known distribution throughout the Northern Rio Grande (Wendorf 1954; Dickson 1975) and may not be the result of a sampling error.

In contrast to the early lithic and Developmental sites, the Coalition (P-III) A.D. 1200-1325 (Wendorf 1954) sites are numerous. Three hundred and thirty-one P-III sites occur throughout the Pajarito District. Although more P-III sites are known for Bland and Rio Chiquito drainages, these have been the most intensively surveyed areas. From Lummis Canyon north, the P-III sites outnumber all others, frequently by a ration of 3:1. The variability in site size is extensive. Sites range from one room to over 500 rooms in extent. The majority of these sites are "medium-sized" pueblos of 11-30 rooms and occur throughout the Pajarito. The larger sites occur in the more northerly drainages. The tremendous increase in number of sites (from 22 to 331) between P-II and P-III suggests in-migration. Hewett (1953) felt that such an immigration occurred slowly over a period of 100 years and was not the result of a sudden influx in population. Since few sites of this phase have been excavated

and the ceramic sequence for this phase does not distinguish sites into early and late P-III components, the rate of any immigration cannot be assessed at this time.

One hundred and eighty-five Classic (P-IV) A.D. 1325-1600 (Wendorf 1954) sites have been recorded in the Pajarito District. The variation in site size that was noted for P-III diminishes in P-IV to a bimodal distribution: extremely small stics of 1-5 rooms and large sites in excess of 50 rooms. Other categories of P-IV sites include ceramic scatters, shelters and terraces. The large sites co-occurring with the extremely small sites (field houses?) and terraces suggests an aggregation of the population into centers with associated sites involving an intensification of land use (terraces) and special use (?) sites (ceramic scatters, shelters).

For the Historic Period A.D. 1540 to present, 75 sites have been located in the Pajarito Plateau District. Sixty-one of these sites have been recorded in the Rio Chiquito Drainage. The remaining historic sites have been located in Sanchez, Medio, Alamo, Canada del Buey, Mortandad, Sandia and Los Alamos drainage basins. With the exception of four sites, the recorded Historic Period sites have been attributed to P-V, 17th or 18th centuries. These sites exhibit considerable variability in size ranging from one to 150 rooms in extent. The majority of sites have less than 10 rooms and the larger sites, in excess of 100 rooms roughly date to the Pueblo Revolt (late 17th century). No 19th century sites and only one 20th century site have been recorded, but a number of Historic sites which were not assigned to a phase may date to these centuries.

Cerros del Rio Plateau District

The Cerros del Rio Plateau District encompasses the lava mesas east of White Rock Canyon, north of the Santa Fe River. It is characterized by short and occasionally deep canyons along the border of the plateau. The relief is subdued in comparison with the Pajarito Plateau. As in the Pajarito District, eighteen drainages dissect the Cerros del Rio Plateau but these are primarily summer-flow streams. Only two vegetative communities (juniper and juniper grassland) occur.

Only 20 archeological sites have been located in this district in contrast to the 710 sites of the Pajarito Plateau District. Those sites which have been located, with the exception of LA 5, a large Anasazi village, were recorded in conjunction with the various phases of the Museum of New Mexico's Cochiti Dam Archeological Salvage Project. For the most part, however, this district was peripheral to the major construction areas and only small portions of the southern extent of the Cerros del Rio were surveyed. One site, LA 8720, a lithic quarry and manufacturing site, was intensively examined (Snow 1973c). The remaining sites located in the Cerros stem from surveys by Dittert, Steen and Schroeder in 1962; Schaafsma in 1966; Snow in 1970, and McNeece in 1972-1973. The 1962 and 1970 surveys covered some areal extent near the proposed borrow areas for Cochiti Dam as well as portions of mesa top across from the mouth of Bland Canyon. The other two surveys were confined to areas below the mouth of White Rock Canyon near the Tetilla Peak Recreation area.

Of the 20 sites located in this district, 10 are lithic sites; 11 are Anasazi Period sites; two are Historic sites; and one site cannot be assigned to a temporal period. Sites have only been located in six of the 18 drainages in the Cerros del Rio: Santa Cruz, Tetilla Canyon (Canada de Cochiti) and Basin Nos. 1, 2, 3, and 6. With the exception of one large P-IV site containing 160 ground floor rooms, all the sites are small lithic scatters or small masonry P-IV sites of 1-3 rooms. A few petroglyphs are associated with the small structural sites. With the exception of one site, none of the lithic sites were associated with hearths. The detail on the character of the lithic assemblages is minimal. Ground stone was noted for one site; choppers were noted for another.

The frequency of sites in this district is the lowest in the study area. In part, this lower frequency may be expected as a function of the limited nature of previous archeological research. The general low vegetative diversity and low level of precipitation, however, may be conditioning the observed site density.

La Bajada-Santa Fe River District

La Bajada District lies solely within the Santa Fe River basin and is unlike the other drainages in the study area in that it drains portions of the Sangre de Cristo Mountains. Its water supply index is significantly higher than others in the study area and is second only to the Rio Grande. The basin is generally characterized by a low vegetative diversity. Only two of the eleven vegetative communities defined for the study area occur here. The prickly pear, cholla and yucca community (Upper Sonoran Arid) follows the steeper slopes along La Bajada scarp and Santa Fe Canyon. The remaining area in the basin is covered by broad expanses of the juniper grassland community. This district also supports the largest continuous tracts of land with the highest arable potential (Class 1 and 2).

Research in this area has been sporadic. Sites which have been located are situated along the north bank of the river. The most extensive work in the area stems from the first surveys and excavations of the Cochiti Dam Salvage Project, Museum of New Mexico. Work in the area includes: an extensive survey by Dittert, Steen and Schroeder in 1962; excavations of sites between 1963-1966, including LA 34, LA 272 and LA 9154; a portion of Schaafsma's petroglyph survey; the location of sites for Irwin-Williams Anasazi Origins Project (1969-1972); an intensive survey by McNeece (1972-1973), part of the roadway to the Tetilla Peak Recreation area; surveys by the Albuquerque Archeological Society (1974-present) in the area around Santa Fe Canyon. Publications and manuscripts include Lange (1968) and Snow (1971; 1973a).

Perhaps 10% of the land area has been surveyed, locating 46 sites with three sites excavated. No Paleo-Indian sites have been located; three Archaic sites have been recorded; three Lithic Unknown, two Basketmaker, 31 Anasazi, 11 Historic and four sites of unknown temporal period have been documented.

The lithic sites are located in the juniper grassland community. No information about the character of these sites has been recorded. Several Developmental (BM-III, P-I, P-II) sites have been recorded in this district. These are generally small sites of one to three pithouses with associated surface or storage rooms. The later P-II sites are usually somewhat larger. One large P-III pueblo of 75-100 rooms has been recorded. Little descriptive information is available for the remaining sites. Three large P-IV sites and a number of small field houses and ceramic and lithic scatters have been recorded.

Cochiti District

The Cochiti District lies south of Bland drainage on the Pajarito Plateau and includes both banks of the Rio Grande below the mouth of White Rock Canyon. The modern vegetative diversity is generally low encompassing broad expanses of juniper and juniper grassland. Precipitation is similar to that in La Bajada and Cerros del Rio Districts and is lower than that in the Pajarito District. The soils in this district along the river are generally suitable for agriculture. The majority of research in this area was stimulated by the construction of Cochiti Dam and the projected development of the town of Cochiti Lake. Although some sites had been recorded by early researchers such as H. P. Mera (1940), the bulk of the information was a result of more recent work, in particular, a survey conducted by Dittert, Steen and Schroeder for the Museum of New Mexico in 1962 and surveys by Lange and Bussey also for the Museum in 1963 (Lange 1968). In the northern portion of the district, in the numbered drainage basins, an intensive foot survey was conducted by Snow in 1969-1970 (Snow 1970). Also a series of sites were excavated in this district by the Museum of New Mexico between 1963-1967).

Seventy sites have been located in the Cochiti District, including five PaleoIndian sites; no Archaic sites; 17 lithic sites for which no temporal components can be assigned; 36 Anasazi sites; 14 Historic sites; and three sites of unknown period. As in the other districts, all of the lithic sites are located in the juniper and juniper grassland communities. These are the dominant communities in this district, however. More of the Anasazi and Historic sites are located in the Rio Grande drainage basin than in the other drainages in the district.

1. **Rio Grande Drainage below the mouth of White Rock Canyon**

Thirty-four of the 70 sites of the Cochiti District are located in the Rio Grande drainage basin. This basin encompasses over half of the total land area of the district. Only one lithic site has been recorded in this drainage basin. A few Developmental sites have been documented. These are generally small sites and range from a lithic scatter with associated hearths to a few sites with pithouses during the BM-III and P-I phases. While the sites during the P-II phase are few, their size is generally large, although the larger sites are associated with P-III components. The P-III sites are the most numerous in the drainage. They range in size from one pueblo of five rooms to one of 88 rooms. The modal size for P-III is 20 rooms. Only four P-IV components have been recorded. The two P-IV sites with descriptive information are medium-large pueblos of 53 and 230 rooms. Both sites were excavated during the Cochiti Dam Salvage Project, Museum of New Mexico. The 230 room pueblo, LA 70, had a small P-III component which was limited to several pithouses. The Historic sites include a Spanish garrison (LA 6178) and a series of Spanish rooms in LA 70.

2. **Basin Nos. 19, 20, 21, 22, 23 and 24**

Sites located in Basin Nos. 19-24 generally consist of two classes: lithic scatters and small structural sites. Between one and three lithic sites are located in each of these drainages with the exception of Basin No. 24 which has 18 lithic sites. Although it is the largest of the unnamed drainage systems, the high frequency of lithic sites over other categories of sites is surprising since no apparent physiographic or vegetative differences exist between the unnamed drainages. As in other drainages and districts, little descriptive information about the character of the lithic sites has been recorded. For the Anasazi Period sites, only P-III and P-IV phases are represented. These sites range from ceramic scatters with a possible masonry structure (field house?) to a 13 room pueblo. The P-III component sites are generally larger than the P-IV component sites.

Rio Grande Drainage in White Rock Canyon

This section will summarize the status of research in the Rio Grande drainage basin north of the mouth of White Rock Canyon and includes both the area in the canyon and portions of the mesa tops which provide drainage directly into the Rio Grande. White Rock Canyon is a deep narrow gorge about 20 kilometers in length and is rimmed by basalt cliffs which rise 100m-300m above the valley floor. This district is the most diverse outside the Pajarito Plateau. Seven vegetative communities within the Upper Sonoran Life Zone occur. Juniper (29.2%) and juniper grassland (15.0%) are the dominant communities. The faunal diversity is high with a number of fish and seasonally available water fowl. Arable land class distribution is similar to that of the Pajarito Plateau with small discontinuous patches of Class 1 and 2 lands.

All of the previous research in this district is relatively recent. Part of the 1963 and 1966 surveys (Lange 1968; Schaafsma 1975) which were associated with the Cochiti Dam Archeological Salvage Project documented sites at the lower end of White Rock Canyon. In 1969-1970, archeologists from Southern Illinois University conducted a survey of the eastern section of the Canada de Cochiti Grant which included a portion of White Rock Canyon between Bland and Capulin Canyons. A later assessment of the grant conducted by archeologists from the University of New Mexico (Flynn and Judge 1973) resurveyed portions of the same area. The most recent work in the canyon aside from the investigations under the present contract, was conducted by archeologists from the National Park Service on those lands which lie below 5460.5 ft contour in Bandelier National Monument. This work has included both survey and excavation (see the Pajarito section on Alamo Canyon).

Sixty-seven sites have been located in this district. The lithic sites include one PaleoIndian, six Archaic and four Lithic Unknown sites. Of the 34 Anasazi sites recorded, three are P-II phase sites, 15 P-III sites and 17 P-IV sites. Nineteen historic sites have been noted and 13 sites are of unknown period. The range in size for sites in the canyon is similar to the other districts in the study area. The lithic sites are generally small debitage scatters with occasional ground stone and are periodically associated with hearths; The Anasazi sites range from one room structures to a 150 room P-III/P-IV pueblo (LA 5137) which is located on a mesa overlooking the canyon. The single component P-III sites range from 20-17 rooms in extent and the single component P-IV sites range only from one to two rooms each. The historic sites include isolated masonry structures and shelters, sheep pens, terraces, isolated storage structures and corrals. The majority of all sites in the canyon regardless of period appear to be small, limited activity areas.

EVALUATION AND SUMMARY OF INFORMATION FROM PREVIOUS RESEARCH

A major difficulty in utilizing information gathered by previous researchers is identifying the manner in which biases in data collection or description may have conditioned the character of information available for current study. An attempt was made in the previous section to identify such biases when possible. After reviewing these previous studies a major problem emerged which centered upon assessing the "intensity" of research conducted in the study area. Among other procedures, this included isolating exactly where surveys had and had not been undertaken; ascertaining whether all classes of sites had been recorded, and documenting the degree of survey areal coverage.

Intensity of Previous Research

The Cochiti study area encompasses over 1325 square kilometers of land. During the past 100 years of research perhaps 10% of this area has been investigated. The scope of investigation, however, has varied significantly between and within the different geographic districts defined for the study area. Even for the Pajarito Plateau District which has had the longest and most diverse history of research, the intensity of coverage has been sporadic. Few drainages have had systematic examination.

Portions of Rio Chiquito and Bland drainages within the Canada de Cochiti Grant and Pueblo de Cochiti Grant have been intensively surveyed. All classes of sites appear to have been recorded including lithic and recent historic sites. With the exception of limited testing and excavations by Nelson (Wissler 1915) and Lange 1958, 1961), no sites have been excavated in these two drainages. Thus the data available are dependent upon the information potential of surficial manifestations.

Rito de los Frijoles has also been intensively examined. The Rito exhibits a high site density, but the intensity of areal coverage is not as reliable as that of Bland or Rio Chiquito. The surveys in this area are extensive in scope. Several large P-IV sites have been excavated, but these excavations were conducted in the early part of the 20th century and information recorded at that time is restricted in its suitability for current analysis.

Extensive surveys and limited excavations have been conducted in the remaining drainages in the Pajarito Plateau District. Although numerous sites have been located, the amount of information recorded is often limited (see Appendix III.1A). From these surveys no PaleoIndian or Archaic Period sites have been located. The absence of these kinds of sites on the plateau appears to be the result of a bias in data collection. On the other hand, numerous prehistoric pueblo sites have been recorded. The sample for P-III and P-IV sites probably reflects the range in variability for Anasazi sites on the plateau although not necessarily the exact distributions. Those Historic Period sites which have been recorded tend to date to the late 16th to 18th centuries, although a few 20th century sites have been noted.

For the Cerros del Rio District, only the southwestern portion of the plateau which overlooks the Rio Grande has been surveyed. There have been no apparent biases in data collection, but the intensity of survey and excavation coverage is the lowest in the study area. Although a considerable diversity in kinds of sites located has been recorded, much more work, both excavation and survey, is needed for this district.

The general intensity of coverage for both the Cochiti and La Bajada Districts is low although greater than the Cerros del Rio District. The most intensive survey in these districts has been in Basin Nos. 20-24 (Snow 1970). In the other basins the survey coverage has been sporadic with a slightly greater intensity near the Rio Grande River. Sites of all periods have been located and P-II, P-III, P-IV and P-V sites have been excavated.

Only the southern portion of White Rock Canyon District, below Capulin Canyon, has been surveyed. The intensity of coverage is roughly comparable to or slightly less than that in Cochiti and La Bajada Districts. For example, of 102 sites located on the survey of the permanent pool of Cochiti Reservoir, only 18 had been recorded by previous researchers. There have been no apparent biases in data collection, for sites of all periods have been documented. Only a few sites near Cochiti Dam have been excavated.

Summary of Information by Cultural Period

Anthropological research has been conducted in the Cochiti study area since the 1880's. The character of this work has been inconsistent and its focus has shifted through time. Certain areas have been more intensively studied than others. Although some sites have been excavated, the bulk of information available for study is derived from survey. Despite these differences in data collection and description, some general tendencies in site distribution and content do emerge for the study area. These will be discussed below.

1. PaleoIndian and Archaic Periods

Of the 85 lithic sites recorded for the study area, eight are PaleoIndian, 28 are Archaic and three are BM-II sites. These sites have generally been assigned to a temporal period on the basis of the presence of "diagnostic" artifacts. The extent of any PaleoIndian or Archaic occupation seems extremely limited. The earliest well-established occupation in the study area appears to date to the late Archaic Period, ca. 800 B.C.

Lithic sites have only been located in the juniper and juniper grassland communities in the southerly portions of the study area, both in the Pajarito Plateau, Cochiti and La Bajada Districts. These sites are generally small and are occasionally associated with hearths or fire-cracked rock. A few of these sites have been intensively examined (Snow 1973c), but for the most part, little information about the character of activities at these sites or the articulation between these sites with other contemporaneous sites has been attempted. For those sites which have been documented, most researchers have presumed manufacturing or quarrying activities.

In general, from previous research it can be concluded that these early occupations are poorly represented in the study area. Biases in data collection seem evident, for the vast majority of all recorded lithic sites have been recorded since 1970. Unfortunately these surveys have been restricted to the southern portions of the study area and thus an attempt to evaluate models concerning PaleoIndian or Archaic Period adaptation is severely limited.

TABLE III.1.1

FREQUENCY OF SITES BY PHASE AND DISTRICT

	PaleoIndian	Archaic	Lithic Unknown	BM-II	BM-III	Basketmaker Unknown	P-I	P-II	P-III	P-IV	Anasazi Unknown	P-V	16th/17th Century	17th/18th Century	19th Century	20th Century	Historic Unknown	Unknown
Pajarito Plateau District																		
Bland	3	5	8	–	–	–	–	–	36	28	3	–	–	–	–	–	–	7
Rio Chiquito	–	1	7	1	–	–	–	3	90	91	4	46	–	7	–	–	12	24
Sanchez	–	–	–	–	–	–	–	1	3	11	–	–	–	–	–	–	2	12
Medio	–	–	–	–	–	–	–	–	5	10	3	–	1	1	–	–	2	5
Capulin	–	–	–	–	–	–	–	–	4	6	–	–	–	–	–	–	–	3
Alamo	–	–	–	–	–	–	–	–	2	5	1	–	–	–	–	–	4	3
Lummis	–	–	–	–	–	–	–	5	36	12	4	–	1	–	–	–	–	4
Rito de los Frijoles	–	–	–	–	–	–	–	4	28	4	–	1	–	–	–	–	1	4
Chaquehui	–	–	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–	2
Ancho	–	–	–	–	–	–	–	–	20	7	7	–	–	–	–	–	–	22
Water	–	–	–	–	–	–	–	–	15	–	6	–	–	–	–	–	–	17
Potrillo	–	–	–	–	–	–	–	–	5	–	9	–	–	–	–	–	–	18
Three Mile, Cedro	–	–	–	–	–	–	–	–	2	–	1	–	–	–	–	–	–	3
Pajarito	–	–	–	–	–	–	–	1	16	3	13	1	–	–	–	–	1	19
Canada del Buey	–	–	–	–	–	1	–	–	10	1	5	–	–	–	–	–	–	12
Mortandad	–	–	–	–	–	–	–	1	7	1	9	–	–	–	–	–	–	4
Sandia	–	–	–	–	–	–	–	–	6	1	5	–	–	–	–	1	–	4
Los Alamos	–	–	–	–	–	–	–	1	4	5	4	1	–	–	–	–	–	2
Cerros del Rio District																		
Santa Cruz	–	1	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Tetilla (Canada de Cochiti)	–	–	1	–	–	–	–	–	–	3	–	–	–	–	–	–	–	–
Arroyo Montoso	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 1	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 2	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
Basin No. 3	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–	–	–
Basin No. 4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 6	–	–	–	–	–	–	–	–	–	4	1	–	–	–	–	–	1	–
Basin No. 7	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 8	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 9	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 10	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 11	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 12	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 14	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
La Bajada District																		
Santa Fe	–	3	3	–	2	–	3	7	9	9	5	2	–	6	–	1	2	4
Cochiti District																		
Rio Grande below White Rock Canyon	–	–	2	–	6	–	6	7	15	5	1	1	–	2	–	7	3	1
Basin No. 16	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 17	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 18	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 19	–	–	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 20	–	2	1	–	–	–	–	–	3	1	–	–	–	–	–	–	–	–
Basin No. 21	–	–	2	–	–	–	–	–	3	3	–	–	–	–	–	–	–	–
Basin No. 22	–	1	2	–	–	–	–	–	6	5	1	–	–	–	–	–	–	–
Basin No. 23	–	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 24	5	5	8	–	–	–	–	–	–	–	2	–	–	–	–	–	1	1
White Rock Canyon District																		
Rio Grande above mouth of White Rock Canyon	–	6	4	–	–	–	–	3	15	17	8	5	–	6	–	1	7	12

TABLE III.1.2

FREQUENCY OF SITES BY
ECOLOGICAL COMMUNITY AND DISTRICT

	Riparian	Cholla, Yucca, Prickly Pear	Scrub Oak	Scrub Oak Pinyon	Pinyon	Pinyon Juniper	Juniper	Juniper Grassland	Ponderosa	Mountain Meadow	Aspen	Douglas Fir	Ecotones	Other
Pajarito Plateau District														
Bland	–	–	–	–	4	–	73	–	–	–	–	–	2	–
Rio Chiquito	–	–	1	1	–	1	179	–	–	–	–	–	16	–
Sanchez	–	–	–	–	1	19	3	–	–	–	–	–	4	–
Medio	–	–	–	–	–	–	12	–	–	–	–	–	10	–
Capulin	–	–	–	–	4	1	2	–	–	–	–	–	–	–
Alamo	–	3	1	–	1	–	–	–	–	–	–	–	7	–
Lummis	–	2	–	–	28	11	–	–	17	–	–	–	7	3
Rito de los Frijoles	–	3	–	–	4	–	2	–	12	–	–	–	13	2
Chaquehui	–	–	–	–	3	–	–	–	1	–	–	–	–	1
Ancho	1	–	–	–	16	–	–	–	34	–	–	–	1	–
Water	–	–	–	–	26	–	–	–	9	1	–	–	1	–
Potrillo	–	–	–	–	15	–	–	–	10	5	–	–	1	1
Three Mile, Cedro	–	–	–	–	2	–	–	–	4	–	–	–	–	–
Pajarito	–	–	–	–	35	–	–	–	5	–	–	–	4	5
Canada del Buey	–	–	–	–	11	–	1	–	6	–	–	–	7	3
Mortandad	–	–	–	–	8	–	–	1	7	–	–	–	3	1
Sandia	–	–	–	–	2	–	–	–	12	–	–	–	2	–
Los Alamos	–	–	–	–	8	–	–	1	1	–	–	–	2	2
Cerros del Rio District														
Santa Cruz	–	–	–	–	–	–	3	2	–	–	–	–	–	–
Tetilla (Canada de Cochiti	–	–	–	–	–	–	–	4	–	–	–	–	–	–
Arroyo Montoso	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 1	–	–	–	–	–	–	1	–	–	–	–	–	–	–
Basin No. 2	–	–	–	–	–	–	2	1	–	–	–	–	–	–
Basin No. 3	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 4	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 5	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 6	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 7	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 8	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 9	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 10	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 11	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 12	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 13	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 14	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 15	–	–	–	–	–	–	–	–	–	–	–	–	–	–
La Bajada District														
Santa Fe	–	3	–	–	–	–	–	21	–	–	–	–	–	21
Cochiti District														
Rio Grande below White Rock Canyon	–	–	–	–	–	–	15	3	–	–	–	–	15	1
Basin No. 16	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 17	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 18	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Basin No. 19	–	–	–	–	–	–	3	–	–	–	–	–	–	–
Basin No. 20	–	–	–	–	–	–	5	–	–	–	–	–	–	–
Basin No. 21	–	–	–	–	–	–	6	–	–	–	–	–	–	–
Basin No. 22	–	–	–	–	–	–	3	–	–	–	–	–	1	–
Basin No. 23	–	–	–	–	–	–	1	–	–	–	–	–	1	–
Basin No. 24	–	–	–	–	–	–	8	5	–	–	–	–	3	–
White Rock Canyon District														
Rio Grande above mouth White Rock Canyon	–	9	–	–	3	5	31	4	–	–	–	–	15	–

TABLE III.1.3

Absolute Room Counts by Anasazi Phase†

No. of Rooms	P-II	P-III	P-IV	P-V	P-II/P-III	P-III/P-IV	P-IV/P-V	P-III/P-IV/P-V
1	1	–	32	–	1	10	2	1
2	–	6	16	5	–	5	–	1
3-5	–	13	15	5	–	9	–	2
6-8	–	28	2	2	–	6	–	1
9-10	–	9	–	–	–	1	–	–
11-15	1	16	1	–	–	8	–	–
16-20	–	14	–	–	–	4	–	–
21-25	–	4	–	–	–	1	–	–
26-30	–	7	–	–	–	1	–	–
31-40	–	–	–	–	1	–	–	–
41-50	–	3	–	–	–	–	–	–
51-60	–	–	1	–	–	–	–	–
61-70	–	1	1	–	1	–	–	–
71-80	–	1	–	–	1	–	–	–
81-90	–	2	1	–	–	–	–	–
91-100	–	–	–	–	–	1	1	–
101-150	–	–	1	2	–	3	–	–
151-200	–	–	–	–	–	–	–	–
200-500	–	–	1	–	1	–	–	–
800	–	–	–	–	–	–	1	–

†When the room counts for a site were stated as a range, e.g. 8-10 rooms or 10-20 rooms, the the total number of rooms in the estimate was averaged and that number was entered in this table.

TABLE III.1.4

Site Size by Anasazi Phases

Size†	BM-III	P-I	P-II	P-III	P-IV	P-V	BM-III/ P-I	P-I/ P-II	P-II/ P-III	P-III/ P-IV	P-IV/ P-V	P-III- P-V
Small	–	–	1	72	65	12	1	2	3	34	2	5
Medium	–	–	1	67	1	1	–	–	–	19	–	–
Large	–	–	–	15	10	2	–	–	4	6	2	2

† These size categories include all sites with room counts as defined below in addition to those described as small, medium or large: Small = 1-10 rooms; medium = 11-30 rooms; large = greater than 31 rooms.

TABLE III.1.5

Nonstructural Anasazi Sites

Site Type	P-I	P-II	P-III	P-IV	P-V	P-III/P-IV	P-IV/P-V	P-IV/P-V
Lithic/ceramic scatter	1	1	4	17	–	4	2	–
Rockshelter	–	–	–	4	–	–	2	1
Terraces	–	–	1	7	–	1	2	–

2. Anasazi Period

Information about the Anasazi Period of occupation for the study area is much better defined and is summarized in Tables III.1.3-5. A general regional chronology, based upon a seriation of ceramic types, was developed in the first half of the 20th century (Mera 1932; 1933; Hawley 1936; Kidder 1924). A few early Anasazi Period sites usually termed the Developmental (BM-III, P-I, and P-II) from A. D. 600-1200 (Wendorf 1954) have been recorded for the study area. Although some have been documented for the Pajarito Plateau, the majority of these sites occur adjacent to or in the modern flood plain of the Rio Grande or Santa Fe drainages. These sites are generally small with one to three pithouses with associated surficial storage structures. Most of the documented Developmental sites date to the latest phase, P-II. Some P-II sites are associated with P-III components. These sites have a tendency to be larger than the single component P-II sites. In general the density of occupation for the Developmental is low. This is consistent with observations of other researchers for the Middle Rio Grande (Wendorf 1954; Dickson 1975).

By A. D. 1200-1325 (Coalition or P-III), the number of Anasazi sites increases dramatically. Three hundred sixty-three P-III sites have been documented for the study area. P-III sites occur in all districts. Their density is greatest in the Pajarito Plateau District but it is high throughout the study area. The range of size for P-III sites is extensive (see Table III.1.3). Although the majority of P-III sites range from 6-10 rooms in extent, 11-30 room sites (or " medium-sized" sites) constitute a class of sites which occur in P-III times but are rare or any other Anasazi phase (see Tables III.1.3-4). In the northern portion of the study area, large P-III sites have been recorded, documenting the first tendency toward aggregation.

By A. D. 1325 (beginning of Classic or P-IV), the tendency for aggregation becomes the dominant settlement strategy. A number of large P-IV sites have been documented throughout the study area; most major drainage systems have one or two large P-IV sites. These appear to be surrounded by several small, one to three room sites (field houses?) with terraces and/or isolated lithic and ceramic scatters (see Table III.1.5). These smaller sites may indicate an intensification in land use by the aggregated population centers.

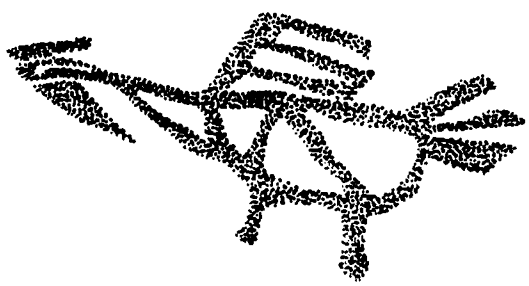
The majority of P-IV sites in the study area are early Glaze A or B sites (A. D. 1325-1450). The later sites are fewer in number and there is some indication that the populations may have been moving out of the study area by the time of the arrival of the Spanish in A. D. 1540.

3. Historic Period

One hundred twenty-five sites dating to the Historic Period have been documented in the study area. Seventy-nine of these date to the late 17th or 18th centuries. The majority of historic sites have been located in the Pajarito Plateau District. With the exception of the large number of sites along the Rio Chiquito, the density of sites for the Historic Period is generally low. The largest historic sites date to the Pueblo Revolt (A. D. 1680-1692). The remaining sites are generally small with less than 10 rooms in extent. These are often associated with corrals and small structures (pens?).

4. Sites of Unknown Period

The remaining 186 sites documented for the study area (see Appendix III.1A), could not be assigned to a particular adaptive system. They either lacked diagnostic artifacts or the presence of the artifacts was not noted for the site descriptions. These sites are generally structural and range from one to 28 rooms in extent. Many petroglyphs, terraces and shelters are included in this category. Based upon their descriptions and location (predominately in the Pajarito Plateau District), the majority of these sites should date to the Anasazi Period.



APPENDIX

TABLE III.1A.1

PALEO-INDIAN, ARCHAIC, BASKETMAKER II and LITHIC UNKNOWN SITES

SITE NO.	PERIOD	ELEV.	DRAINAGE BASIN	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 5098	Archaic	5700	Basin No. 20	Upper Sonoran Juniper	lithic scatter
LA 5101	Lithic Unknown	5360	RG below WRC	Upper Sonoran Juniper	lithic scatter
LA 5102	Lithic Unknown	5500	RG below WRC	Upper Sonoran Juniper	lithic scatter
LA 5103	Lithic Unknown	5500	RG/WRC	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5107	Lithic Unknown	5500	Basin No. 19	Upper Sonoran Juniper	lithic scatter
LA 5110	Archaic	5700	Bland	Upper Sonoran Juniper	lithic scatter
LA 5117	Lithic Unknown	5500	Basin No. 19	Upper Sonoran Juniper	lithic scatter
LA 5119	Archaic	5650	Santa Cruz	Upper Sonoran Juniper	lithic scatter
LA 5130	Archaic	5630	RG/WRC	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5141	Archaic	5360	Santa Fe	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5142	Lithic Unknown	5440	Santa Fe	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5143	Lithic Unknown	5340	Santa Fe	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5144	Lithic Unknown	5410	Santa Fe	Upper Sonoran Juniper-Grassland	lithic scatter
LA 5145	Lithic Unknown	5340	Tetilla	Upper Sonoran Juniper-Grassland	lithic scatter
LA 8720	Archaic	5430	Basin No. 1	Upper Sonoran Juniper	lithic scatter; quarry (?)
LA 9500	Archaic/Bajada	6180	Santa Fe	n.d.	lithic scatter
LA 9501	Archaic	6180	Santa Fe	n.d.	lithic scatter
LA 9906	Basketmaker II	5800	Rio Chiquito	Upper Sonoran Juniper	hearth; lithic scatter, possible intrusive ceramics
LA 9916	Lithic Unknown	5870	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 9919	Lithic Unknown	5880	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 9931	Lithic Unknown	5510	Basin No. 21	Upper Sonoran Juniper	lithic scatter
LA 9932	Lithic Unknown	5520	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 9933	Paleo-Indian	5680	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9934	Paleo-Indian (?)	5650	Bland	Upper Sonoran Juniper	lithic scatter
LA 9935	Paleo-Indian (?)	5630	Bland	Upper Sonoran Juniper	lithic scatter
LA 9936	Lithic Unknown	5560	Bland	Upper Sonoran Juniper	lithic scatter
LA 9937	Paleo-Indian/ Archaic (?)	5510	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 9938	Archaic	5630	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9939	Archaic	5610	Basin No. 22	Upper Sonoran Juniper	lithic scatter
LA 9940	Lithic Unknown	5615	Basin No. 22	Upper Sonoran Juniper	lithic scatter
LA 9941	Lithic Unknown	5660	Basin No. 21	Upper Sonoran Juniper	lithic scatter
LA 9942	Archaic (?)	5530	Basin No. 23	Upper Sonoran Juniper	lithic scatter
LA 9943	Lithic Unknown	5700	Bland	Upper Sonoran Juniper	lithic scatter; possible intrusive ceramics
LA 9945	Lithic Unknown	5700	Basin No. 22	Upper Sonoran Juniper	lithic scatter
LA 9946	Lithic Unknown	5525	Basin No. 23	Upper Sonoran Juniper-Grassland	lithic scatter
LA 9947	Lithic Unknown	5560	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9948	Lithic Unknown	5610	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9949	Lithic Unknown	5500	Basin No. 24	Upper Sonoran Juniper	lithic scatter

TABLE III.1A.1 (con't)

SITE NO.	PERIOD		DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9950	Lithic Unknown	5520	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9951	Paleo-Indian/ Archaic (?)	5560	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9952	Paleo-Indian/ Archaic (?)	5540	Basin No. 24	Ecotone: Juniper/Juniper Grassland	lithic and ceramic scatter
LA 9953	Archaic	5630	RG/WRC	Upper Sonoran Juniper-Grassland	lithic scatter
LA 9954	Lithic Unknown	5540	Bland	Ecotone: Juniper/Juniper Grassland	lithic scatter
LA 9955	Lithic Unknown	5510	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 9956	Lithic Unknown	5720	Basin No. 24	Upper Sonoran Juniper	lithic scatter; possible intrusive ceramics
LA 10553	Archaic (?)	5720	Bland	Upper Sonoran Juniper	lithic scatter
LA 10558	Lithic Unknown	5720	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 10562	Lithic Unknown	5640	Basin No. 20	Upper Sonoran Juniper	lithic scatter
LA 10563	Lithic Unknown	5640	Bland	Upper Sonoran Juniper	lithic scatter
LA 10564	Lithic Unknown	5660	Bland	Upper Sonoran Juniper	lithic scatter
LA 10565	Archaic	5630	Basin No. 20	Upper Sonoran Juniper	lithic scatter
LA 10569	Paleo-Indian (?)	5490	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 10570	Paleo-Indian/ Archaic	5580	RG/WRC	Upper Sonoran Juniper-Grassland	lithic scatter
LA 10571	Lithic Unknown	5700	Bland	Upper Sonoran Juniper	lithic scatter
LA 10572	Lithic Unknown	5640	Bland	Upper Sonoran Juniper	lithic scatter
LA 10573	Archaic (?)	5640	Bland	Upper Sonoran Juniper	lithic scatter
LA 10574	Archaic (?)	5740	Bland	Upper Sonoran Juniper	lithic scatter
LA 10580	Lithic Unknown	5610	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 10583	Lithic Unknown	5600	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 10587	Lithic Unknown	5000	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 10588	Lithic Unknown	5520	Basin No. 24	Upper Sonoran Juniper-Grassland	lithic scatter
LA 10589	Archaic	5640	Bland	Upper Sonoran Juniper	lithic scatter
LA 10590	Lithic Unknown	5680	Bland	Upper Sonoran Juniper	possible hearths; lithic scatter
LA 10591	Paleo-Indian (?)	5840	Bland	Upper Sonoran Juniper	lithic scatter; possible intrusive ceramics
LA 11586	Lithic Unknown	5540	Santa Cruz	Upper Sonoran Juniper-Grassland	lithic scatter; petroglyphs
LA 11587	Lithic Unknown	5500	Santa Cruz	Upper Sonoran Juniper-Grassland	lithic scatter
LA 11588	Lithic Unknown	5460	Santa Cruz	Upper Sonoran Juniper	lithic scatter
LA 11589	Archaic (?)	5560	Basin No. 2	Upper Sonoran Juniper	lithic scatter
LA 11590	Lithic Unknown	5540	Basin No. 2	Upper Sonoran Juniper-Grassland	lithic scatter
LA 11591	Archaic	5540	RG/WRC	Upper Sonoran Juniper-Grassland	hearth; lithic scatter
LA 11592	Lithic Unknown	5420	RG/WRC	Upper Sonoran Juniper	1 hearth
LA 12163	Lithic Unknown	5430	RG/WRC	Upper Sonoran Juniper	lithic scatter
LA 12167	Lithic Unknown	5380	RG/WRC	Ecotone: Juniper/Arid	lithic scatter
LA 12169	Archaic	5460	RG/WRC	Upper Sonoran Juniper	lithic scatter
LA 12190	Archaic	5600	RG/WRC	Upper Sonoran Juniper	lithic scatter
LA 12227	Lithic Unknown	5650	Rio Chiquito	Upper Sonoran Juniper	lithic scatter
LA 12250	Lithic Unknown	5760	Rio Chiquito	Ecotone: Juniper/Arid	lithic scatter
LA 12260	Archaic (?)	5560	Rio Chiquito	Upper Sonoran Pinyon-Juniper	lithic scatter

TABLE III.1A.2

DEVELOPMENTAL ANASAZI/BM-III, P-I, P-II
(A.D. 600-1200)

SITE NO.	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 55	BM-III to P-II	5240	RG below WRC	Ecotone: Riparian/Modern Fields	ceramic scatter
LA 113	BM-III to P-II	5400	RG below WRC	Upper Sonoran Juniper	small pueblo
LA 116	P-II	6060	Santa Fe	n.d.	n.d.
LA 177	BM-III	5820	Santa Fe	n.d.	n.d.
LA 210	P-II	6450	Los Alamos	Upper Sonoran Pinyon	n.d.
LA 223	P-II	6520	Lummis	Upper Sonoran Pinyon	n.d.
LA 230	P-II	5520	Santa Fe	Upper Sonoran Arid	n.d.
LA 249	BM-III	5290	RG below WRC	Upper Sonoran Juniper-Grassland	150-200 rooms; 2-4 kivas
LA 256	P-II	5640	Santa Fe	Upper Sonoran Arid	ceramic scatter
LA 265	BM-III/ P-I	5275	RG below WRC	Upper Sonoran Juniper-Grassland	2-4 rooms; field house; ceramic scatte
LA 266	P-II	5620	Santa Fe	Upper Sonoran Arid	n.d.
LA 272	P-I/ P-II	5370	Santa Fe	Upper Sonoran Juniper-Grassland	3 pithouses; 2 surface structures
LA 327	P-II	5250	RG below WRC	Ecotone: Juniper/Modern Fields	1 roomblock, 10-20 rooms; 1-2 kivas
LA 353	P-II	6530	Pajarito	Upper Sonoran Pinyon	40 rooms
LA 670	P-II	6160	Frijoles	Upper Sonoran Arid	n.d.
LA 1107	P-II	6450	Mortandad	Upper Sonoran Arid	60-70 rooms; 1 kiva
LA 3816	P-II	6380	RG/WRC	Ecotone: Juniper-Grassland/ Pinyon- Juniper	n.d.
LA 3817	P-II	6400	Frijoles	Ecotone: Juniper-Grassland/ Pinyon- Juniper	n.d.
LA 3818	P-II	n.d.	n.d.	n.d.	n.d.
LA 3819	P-II	6380	Frijoles	Upper Sonoran Pinyon	n.d.
LA 3820	P-II	6880	RG/WRC	Econtone: Juniper-Grassland/ Pinyon- Juniper	n.d.
LA 3821	P-II	6380	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA 3822	P-II	6380	RG/WRC	Upper Sonoran Pinyon	n.d.
LA 3823	P-II	6350	Lummis	Upper Sonoran Pinyon	n.d.
LA 3850	P-II	6160	Frijoles	Upper Sonoran Arid	n.d.
LA 3852	P-II	6500	Lummis	Upper Sonoran Pinyon	n.d.
LA 3859	P-II	6460	Lummis	Upper Sonoran Pinyon	n.d.
LA 5018	P-II	5880	Rio Chiquito	Upper Sonoran Juniper	small pueblo
LA 5141	P-I	5360	Santa Fe	Upper Sonoran Juniper-Grassland	lithic scatter
LA 6169	P-II	5240	RG below WRC	Ecotone: Juniper-Grassland/ Modern Fields	1 "U-shaped" roomblock, 15-20 rooms; 1 kiva
LA 6172	BM-III/ P-I	5240	RG below WRC	Ecotone: Riparian/Juniper-Grassland/Modern Fields	indeterminate number of rooms & pithouses

TABLE III.1A.2 (con't)

SITE NO.	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 6173	BM-III/ P-I	5280	RG below WRC	Upper Sonoran Juniper-Grassland	2 rooms; hearths; fire-cracked rock; lithic scatter
LA 6174	P-I/P-II	5240	RG below WRC	Ecotone: Juniper-Grassland/ Fields	1 structure; 1 pithouse; 3 hearths
LA 6295	P-II	6200	Santa Fe	n.d.	1 structure; 1 pithouse
LA 6461	P-II	5280	RG below WRC	Upper Sonoran Juniper	75 rooms; 4 pithouses
LA 6462	P-II	5300	RG below WRC	Upper Sonoran Juniper	43 rooms; 3 kivas; 11 pithouses
LA 9140	BM-III/ P-I	5450	Santa Fe	Upper Sonoran Juniper-Grassland	3 pithouses
LA12131	P-II	5950	Santa Fe	Upper Sonoran Juniper-Grassland	2 pithouses; surface structures
LA12211	P-II	5700	Sanchez	Upper Sonoran Pinyon-Juniper	2 roomblocks; 100 rooms; trash
LA12218	P-II	5870	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic & ceramic scatter
LA12252	P-II	5870	Rio Chiquito	Ecotone: Juniper/Arid	scattered masonry shelters

TABLE III.1A.3

ANASAZI COALITION/P-III SITES
(A.D. 1200-1325)

SITE		ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA	3	6100	Santa Fe	n.d.	large pueblo
LA	70	5550	RG below WRC	*Upper Sonoran Juniper*	230 rooms; 8 kivas; 2 pithouses (?); trash
LA	79	5900	Rio Chiquito	Upper Sonoran Juniper	3 rubble mounds
LA	113	5400	RG below WRC	Upper Sonoran Juniper	small pueblo; trash
LA	150	5960	Santa Fe	n.d.	small site
LA	170	6580	Pajarito	Upper Sonoran Pinyon	200 rooms
LA	174	n.d.	Frijoles	n.d.	rubble mounds
LA	210	6450	Los Alamos	Upper Sonoran Pinyon	n.d.
LA	211	6680	Los Alamos	Upper Sonoran Juniper-Grassland	large pueblo; cavates; additional structures
LA	212	6500	Mortandad	Upper Sonoran Pinyon	15-20 rooms; 1 kiva
LA	214	6480	Mortandad	Upper Sonoran Pinyon	4 roomblocks, 60-70 rooms; no kivas
LA	219	6540	Frijoles	Upper Sonoran Pinyon	n.d.
LA	223	6520	Lummis	Upper Sonoran Pinyon	1 rectangular roomblock
LA	247	5300	RG below WRC	Upper Sonoran Juniper	8 roomblocks, 75-100 rooms; 3 kivas
LA	249	5290	RG below WRC	Upper Sonoran Juniper-Grassland	150-200 rooms; 2-4 kivas; unspecified structures
LA	250	6530	Alamo	Upper Sonoran Pinyon	large pueblo
LA	257	6480	Mortandad	Upper Sonoran Pinyon	200 rooms; 2 kivas
LA	266	5620	Santa Fe	Upper Sonoran Arid	n.d.
LA	328	5260	RG below WRC	Ecotone: Juniper/Modern Fields	1 roomblock; 20 rooms; 1-3 kivas
LA	329	5245	RG below WRC	Ecotone: Juniper/Modern Fields	rectangular roomblocks, 15-25 rooms; 1-3 kivas
LA	330	5245	RG below WRC	Ecotone: Riparian/Juniper/Modern Fields	4-8 rooms; possible kivas
LA	331	5280	RG below WRC	Upper Sonoran Juniper	12 roomblocks, 75 rooms; 12 kivas
LA	332	5320	RG below WRC	Upper Sonoran Juniper	2 roomblocks, 2 rooms; possible kiva
LA	333	5260	RG below WRC	Upper Sonoran Juniper	ceramic scatter
LA	338	5540	Los Alamos	Upper Sonoran Pinyon	20 rooms; possible kiva
LA	343	6480	Water	Upper Sonoran Pinyon	1-2 rooms
LA	344	6490	Water	Upper Sonoran Pinyon	2 roomblocks, 10-15 rooms; possible kiva
LA	345	6525	Water	Upper Sonoran Pinyon	15-20 rooms; possible kiva
LA	346	6530	Water	Upper Sonoran Pinyon	10 rooms; possible kiva
LA	347	6575	Water	Upper Sonoran Pinyon	20-30 rooms; possible kiva
LA	348	6575	Pajarito	Upper Sonoran Pinyon	10-12 rooms; possible kiva
LA	349	6580	Water	Upper Sonoran Pinyon	2 roomblocks, 20-25 rooms; possible kiva
LA	350	6580	Pajarito	Upper Sonoran Pinyon	2 roomblocks, 30 rooms; possible kiva
LA	351	6560	Pajarito	Upper Sonoran Pinyon	n.d.
LA	352	6540	Pajarito	Upper Sonoran Pinyon	15-20 rooms; possible kiva
LA	353	6530	Pajarito	Upper Sonoran Pinyon	40 rooms
LA	354	6510	Water	Upper Sonoran Pinyon	20 rooms
LA	355	6540	Water	Upper Sonoran Pinyon	75-100 rooms; 1 kiva
LA	369	5500	Santa Fe	Upper Sonoran Juniper-Grassland	possible structure; ceramic scatter

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 394	6510	Los Alamos	Upper Sonoran Pinyon	10 rooms; possible kiva
LA 408	5520	Santa Fe	Upper Sonoran Juniper-Grassland	n.d.
LA 409	5560	Santa Fe	Upper Sonoran Juniper-Grassland	n.d.
LA 412	5200	Galisteo	n.d.	1 roomblock
LA 569	6540	Frijoles	Upper Sonoran Pinyon	n.d.
LA 670	6160	Frijoles	Upper Sonoran Arid	n.d.
LA 1106	6460	Mortandad	Upper Sonoran Pinyon	50 rooms; 1 kiva
LA 1107	6450	Mortandad	Upper Sonoran Pinyon	60-70 rooms; 1 kiva
LA 1480	5830	Santa Fe	n.d.	isolated structure
LA 2409	6520	RG/WRC	Ecotone: Juniper/Arid	small site; 2 kivas
LA 2992	6420	Los Alamos	n.d.	ceramic scatter
LA 3448	5880	Rio Chiquito	Upper Sonoran Juniper	6 rooms
LA 3450	5780	Rio Chiquito	Upper Sonoran Juniper	4-6 rooms
LA 3653	5740	Bland	Upper Sonoran Juniper	16 rooms
LA 3657	5760	Rio Chiquito	Upper Sonoran Juniper	12-20 rooms†
LA 3658	5740	Bland	Upper Sonoran Juniper	10-12 masonry rooms
LA 3659	5730	Bland	Upper Sonoran Juniper	8-10 masonry rooms
LA 3660	5740	Bland	Upper Sonoran Juniper	8-10 masonry rooms; lithic scatter
LA 3661	5740	Rio Chiquito	Upper Sonoran Juniper	10-12 rooms
LA 3663	5700	Bland	Upper Sonoran Juniper	3-4 rooms†
LA 3664	5680	Bland	Upper Sonoran Juniper	4-5 rooms
LA 3665	5690	Bland	Upper Sonoran Juniper	4-5 rooms
LA 3666	5700	Bland	Upper Sonoran Juniper	4-5 rooms
LA 3751	6540	Lummis	Upper Sonoran Pinyon	n.d.
LA 3752	6580	Lummis	Upper Sonoran Pinyon	n.d.
LA 3753	n.d.	Frijoles	n.d.	n.d.
LA 3755	6500	Lummis	Upper Sonoran Pinyon	n.d.
LA 3756	6520	Lummis	Upper Sonoran Pinyon	n.d.
LA 3757	6520	Lummis	Upper Sonoran Pinyon	n.d.
LA 3760	6760	Lummis	Upper Sonoran Pinyon	n.d.
LA 3761	6740	Lummis	Upper Sonoran Pinyon	n.d.
LA 3762	6720	Lummis	Upper Sonoran Pinyon	n.d.
LA 3763	6720	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3764	6720	Lummis	Upper Sonoran Pinyon	n.d.
LA 3765	6740	Lummis	Upper Sonoran Pinyon	n.d.
LA 3766	6840	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3767	6840	Lummis	Transition: Ponderosa	n.d.
LA 3768	6840	Lummis	Transition: Ponderosa	n.d.
LA 3769	6840	Frijoles	Transition: Ponderosa	n.d.
LA 3770	6820	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3771	6600	Lummis	Upper Sonoran Pinyon	n.d.

†conflicting information

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 3772	6520	Lummis	Upper Sonoran Pinyon	n.d.
LA 3773	6540	Lummis	Upper Sonoran Pinyon	n.d.
LA 3774	6570	Lummis	Upper Sonoran Pinyon	n.d.
LA 3776	6520	Frijoles	Upper Sonoran Pinyon	n.d.
LA 3777	6940	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA 3778	6900	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA 3779	7060	Lummis	Transition: Ponderosa	n.d.
LA 3781	n.d.	Lummis	n.d.	n.d.
LA 3782	7220	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3783	7200	Frijoles	Transition: Ponderosa	n.d.
LA 3784	7180	Frijoles	Transition: Ponderosa	n.d.
LA 3785	7140	Frijoles	Transition: Ponderosa	n.d.
LA 3786	7080	Frijoles	Transition: Ponderosa	n.d.
LA 3787	7060	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3788	7020	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3789	7020	Frijoles	Transition: Ponderosa	n.d.
LA 3790	7000	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3791	6990	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3794	7060	n.d.	n.d.	n.d.
LA 3796	n.d.	Lummis	Transition: Ponderosa	n.d.
LA 3797	7130	Lummis	Transition: Ponderosa	n.d.
LA 3798	7020	Lummis	Transiton: Ponderosa	n.d.
LA 3799	7260	Lummis	Transition: Ponderosa	n.d.
LA 3800	7220	Lummis	Transition: Ponderosa	n.d.
LA 3802	7200	Lummis	Transition: Ponderosa	n.d.
LA 3803	6880	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 3804	6600	Lummis	Ecotone: Pinyon/Scrub Oak	n.d.
LA 3805	6800	Lummis	Transition: Ponderosa	n.d.
LA 3806	6820	Lummis	Transition: Ponderosa	n.d.
LA 3808	6840	Lummis	Transition: Ponderosa	n.d.
LA 3809	6920	Lummis	Transition: Ponderosa	n.d.
LA 3810	7230	Lummis	Transition: Ponderosa	n.d.
LA 3811	7280	Lummis	Transition: Ponderosa	n.d.
LA 3813	6830	Lummis	Upper Sonoran Pinyon	n.d.
LA 3814	6800	Lummis	Upper Sonoran Pinyon	n.d.
LA 3815	6800	Lummis	Upper Sonoran Pinyon	n.d.
LA 3816	6380	RG/WRC	Ecotone: Juniper-Grassland/Pinyon-Juniper	n.d.
LA 3817	6400	Frijoles	Ecotone: Juniper-Grassland/Pinyon-Juniper	n.d.
LA 3818	n.d.	n.d.	n.d.	n.d.
LA 3819	6580	Frijoles	Upper Sonoran Pinyon	n.d.
LA 3820	6880	RG/WRC	Ecotone: Juniper-Grassland/Pinyon-Juniper	n.d.
LA 3821	6380	Lummis	Upper Sonoran Pinyon-Juniper	n.d.

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 3822	6380	RG/WRC	Upper Sonoran Pinyon	n.d.
LA 3823	6350	Lummis	Upper Sonoran Pinyon	n.d.
LA 3830	6560	Capulin	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3832	6420	Capulin	Upper Sonoran Pinyon	n.d.
LA 3835	6390	Capulin	Upper Sonoran Juniper	n.d.
LA 3836	6400	Medio	Upper Sonoran Juniper	n.d.
LA 3837	6400	Medio	Upper Sonoran Juniper	n.d.
LA 3838	6360	Capulin	Upper Sonoran Juniper	n.d.
LA 3842	6680	Frijoles	Transition: Ponderosa	n.d.
LA 3843	6640	Frijoles	Transition: Ponderosa	n.d.
LA 3844	6610	Frijoles	Transition: Ponderosa	n.d.
LA 3845	6590	Frijoles	Transition: Ponderosa	n.d.
LA 3846	6690	Chaquehui	Transition: Ponderosa	n.d.
LA 3847	6750	Frijoles	Ecotone: Pinyon/ponderosa	n.d.
LA 3848	6800	Frijoles	Transition: Ponderosa	n.d.
LA 3850	6160	Frijoles	Upper Sonoran Arid	n.d.
LA 3851	6540	Lummis	Upper Sonoran Pinyon	n.d.
LA 3852	6500	Lummis	Upper Sonoran Pinyon	n.d.
LA 3853	6500	Lummis	Upper Sonoran Pinyon	n.d.
LA 3854	6460	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA 3855	6570	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3856	6520	Lummis	Upper Sonoran Pinyon	n.d.
LA 3857	6500	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3858	n.d.	Lummis	Upper Sonoran Pinyon	n.d.
LA 3859	6460	Lummis	Upper Sonoran Pinyon	n.d.
LA 4607	6940	Mortandad	Transition: Ponderosa	large site; 1 kiva
LA 4611	7120	Canada del Buey	Transition: Ponderosa	possible structures
LA 4622	6780	Pajarito	Upper Sonoran Pinyon	2 noncontiguous roomblocks
LA 4623	6780	Pajarito	Upper Sonoran Pinyon	3 noncontiguous roomblocks
LA 4625	n.d.	n.d.	n.d.	parallel roomblocks
LA 4626	6740	Pajarito	Upper Sonoran Pinyon	6-8 rooms
LA 4628	7401	Pajarito	Ecotone: Pinyon/Ponderosa	7 rooms
LA 4631	6710	Canada del Buey	Upper Sonoran Pinyon	8 rooms
LA 4633	6710	Pajarito	Upper Sonoran Pinyon	3 contiguous rooms
LA 4635	6550	Ancho	Upper Sonoran Pinyon	8 rooms
LA 4645	6500	Ancho	Upper Sonoran Pinyon	6-10 rooms†
LA 4646	6500	Chaquehui	Upper Sonoran Pinyon	6-10 rooms†
LA 4647	6500	Ancho	Upper Sonoran Pinyon	6-10 rooms†
LA 4648	6500	Ancho	Upper Sonoran Pinyon	1 rubble mound
LA 4656*	n.d.	Pajarito	n.d.	1 rubble mound
LA 4662	7200	Potrillo	Upper Sonoran Pinyon	1 masonry room
LA 4696	7100	Ancho	Transition: Ponderosa	3 noncontiguous roomblocks

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 4697	7090	Ancho	Transition: Ponderosa	3 noncontiguous roomblocks possible kiva
LA 4698	7100	Ancho	Transition: Ponderosa	2 noncontiguous roomblocks, 7 rooms
LA 4704	7140	Ancho	Transition: Ponderosa	1 roomblock; possible kiva
LA 4708	6980	Ancho	Transition: Ponderosa	2 noncontiguous roomblocks, 2 kivas
LA 4711	7000	Los Alamos	Transition: Ponderosa	2 rooms
LA 4713	7002	Sandia	Transition: Ponderosa	2 rooms
LA 4714	6990	Sandia	Transition: Ponderosa	2 rubble mounds, 8 rooms
LA 4715	7020	Los Alamos	Ecotone: Pinyon/Ponderosa	11 rooms
LA 4716	6960	Sandia	Transition: Ponderosa	n.d.
LA 4717	6960	Santa Fe	Ecotone: Pinyon/ponderosa	1 room
LA 4718	6960	Sandia	Transition: Ponderosa	1 "L-"shaped roomblock, possible kiva†
LA 4724	6920	Sandia	Transition: Ponderosa	n.d.
LA 4727	6920	Sandia	Ecotone: Pinyon/Ponderosa	8 rooms
LA 4997	6120	Frijoles	Ecotone: Riparian/Arid	indeterminate number of rooms
LA 5014	5320	RG/WRC	Ecotone: Juniper/Arid	2 noncontiguous roomblocks, 15 rooms; 3 kivas; lithic and ceramic scatter
LA 5016	5610	Medio	Upper Sonoran Juniper	rectangular structures, 1-3 rooms
LA 5018	5880	Rio Chiquito	Upper Sonoran Juniper	small site
LA 5021	5920	Rio Chiquito	Upper Sonoran Juniper	1 roomblock
LA 5022	5880	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 5023	5940	Rio Chiquito	Upper Sonoran Juniper	30 rooms
LA 5097	5770	Bland	Upper Sonoran Juniper	10-12 masonry rooms
LA 5098	5770	Basin No. 20	Upper Sonoran Juniper	1 room; lithic and ceramic scatter
LA 5099	5650	Basin No. 20	Upper Sonoran Juniper	linear roomblock, 2-4 masonry rooms
LA 5100	5640	Basin No. 20	Upper Sonoran Juniper	10 rooms
LA 5105	5650	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 5111	5940	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 5112	5960	Bland	Upper Sonoran Juniper	2 rubble mounds, 10-12 masonry rooms
LA 5113	5860	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 5114	5940	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 5115	5780	Bland	Upper Sonoran Juniper	12-14 masonry rooms
LA 5116	5690	Basin No. 21	Upper Sonoran Juniper	13 masonry rooms
LA 5120	5820	Bland	Upper Sonoran Juniper	8-12 masonry rooms
LA 5122	5880	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 5137	5700	RG/WRC	Upper Sonoran Juniper-Grassland	150 rooms; possible field house; check dams; petroglyphs
LA 6171	5290	RG below WRC	Ecotone: Riparian/Juniper Grassland	2 roomblocks, 20-30 rooms; 2-3 kivas; possible subterranean structure
LA 6177	5320	RG below WRC	Upper Sonoran Juniper	1 roomblock, 8 rooms; possible kiva
LA 6456	5320	RG below WRC	Upper Sonoran Juniper	1 roomblock, 8 rooms; possible kiva

†conflicting information

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 6458	5360	Basin No. 21	Upper Sonoran Juniper	1 room; possible field house
LA 6459	5360	Basin No. 21	Upper Sonoran Juniper	lithic and ceramic scatter
LA 6461	5280	RG below WRC	Upper Sonoran Juniper	75 rooms; 4 pithouses (?)
LA 6462	5300	Galisteo	Upper Sonoran Juniper	43 rooms; 3 kivas; 11 pithouses (?)
LA 6786	6550	Water	Upper Sonoran Pinyon	7 rooms; 1 kiva
LA 6787	6550	Water	Upper Sonoran Pinyon	30 rooms; 1 kiva
LA 6788	6770	Potrillo	Upper Sonoran Pinyon	2-4 rooms; no kivas
LA 6789	6690	Pajarito	Upper Sonoran Pinyon	25 rooms; possible kiva; trash
LA 6791	6980	Canada del Buey	Ecotone: Pinyon/Ponderosa	10-20 rooms; 1 kiva
LA 6792	6980	Canada del Buey	Ecotone: Pinyon/Ponderosa	10-15 rooms; 1 kiva
LA 8988	6790	Mortandad	Upper Sonoran Juniper-Grassland	3 roomblocks, 25-30 rooms; 2-3 kivas
LA 8993	5680	Santa Fe	n.d.	indeterminate number of adobe structures
LA 9781	5520	RG/WRC	Upper Sonoran Juniper	6 rooms; trash
LA 9783	5520	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 9784	5540	RG/WRC	Upper Sonoran Juniper	1 "L-"shaped roomblock, 3 rooms
LA 9787	5600	Bland	Upper Sonoran Juniper	12 rooms
LA 9788	5550	RG/WRC	Upper Sonoran Juniper	1 room
LA 9791	6160	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room
LA 9793	5680	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room
LA 9799	5800	Sanchez	Upper Sonoran Pinyon-Juniper	indeterminate number of rooms
LA 9801	5590	RG/WRC	Upper Sonoran Pinyon-Juniper	2 rooms
LA 9806	5690	Rio Chiquito	Upper Sonoran Juniper	cavete
LA 9808	5720	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9810	5900	Rio Chiquito	Upper Sonoran Juniper	rock shelter; petroglyphs
LA 9811	5630	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9813	5680	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9818	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9819	5880	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms; terraces
LA 9820	5880	Rio Chiquito	Upper Sonoran Juniper	1 room; trash
LA 9826	5880	Rio Chiquito	Upper Sonoran Juniper	20 rooms
LA 9827	5860	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9828	5860	Rio Chiquito	Upper Sonoran Juniper	lithic and ceramic scatter
LA 9830	5820	Rio Chiquito	Upper Sonoran Juniper	isolated walls
LA 9831	5820	Bland	Upper Sonoran Juniper	150 rooms
LA 9832	5740	Rio Chiquito	Upper Sonoran Juniper	10-15 rooms
LA 9836	5580	Rio Chiquito	Upper Sonoran Juniper	3 rooms; terraces
LA 9838	5800	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock
LA 9839	5780	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9840	5800	Rio Chiquito	Upper Sonoran Juniper	14-15 rooms
LA 9841	5800	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9842	5760	Rio Chiquito	Upper Sonoran Juniper	4-6 rooms

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9843	5760	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9845	5740	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9847	5740	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9848	5760	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 8-12 rooms
LA 9849	5760	Rio Chiquito	Upper Sonoran Juniper	4 rooms
LA 9850	5760	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock, 15 rooms
LA 9851	5780	Rio Chiquito	Upper Sonoran Juniper	8 rooms
LA 9852	5760	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9854	5740	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock, 4-6 rooms
LA 9855	5760	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 8-12 rooms
LA 9859	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms; several rock alignments
LA 9860	5820	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9862	5800	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 30 rooms
LA 9863	5770	Rio Chiquito	Upper Sonoran Juniper	12 rooms
LA 9865	5790	Rio Chiquito	Upper Sonoran Juniper	12 rooms
LA 9867	5730	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 20 rooms
LA 9869	5720	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9870	5700	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock
LA 9872	6840	Bland	Upper Sonoran Pinyon	1-2 rooms; trash
LA 9873	6850	Bland	Upper Sonoran Pinyon	1-2 rooms; trash
LA 9876	5800	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9877	5830	Rio Chiquito	Upper Sonoran Juniper	3-6 rooms
LA 9878	5820	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock, 6 rooms
LA 9880	5800	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room
LA 9883	5820	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9884	5800	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 2-4 rooms
LA 9885	5790	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 12 rooms
LA 9886	5730	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9890	5800	Rio Chiquito	Upper Sonoran Juniper	unspecified structures
LA 9891	5860	Rio Chiquito	Upper Sonoran Juniper	10-12 rooms
LA 9892	5860	Rio Chiquito	Upper Sonoran Juniper	n.d.
LA 9893	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9894	5860	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9895	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rectangular structures
LA 9899	5800	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9900	5710	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 4 rooms
LA 9901	5950	Rio Chiquito	Upper Sonoran Juniper	3 rooms

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9902	5740	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 3 rooms
LA 9906	5800	Rio Chiquito	Upper Sonoran Juniper	possible hearths; lithic & ceramic scatter
LA 9907	5840	Rio Chiquito	Upper Sonoran Juniper	8 rooms
LA 9912	5870	Rio Chiquito	Upper Sonoran Juniper	2 parallel roomblocks
LA 9913	5870	Rio Chiquito	Upper Sonoran Juniper	6 rooms
LA 9918	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9920	5880	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9921	5880	Rio Chiquito	Upper Sonoran Juniper	8 rooms
LA 9922	5880	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9923	5860	Rio Chiquito	Upper Sonoran Juniper	10 rooms
LA 9924	5880	Rio Chiquito	Upper Sonoran Juniper	20 rooms
LA 9925	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9926	5880	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9927	5860	Rio Chiquito	Upper Sonoran Juniper	9 rooms
LA 9929	5850	Rio Chiquito	Upper Sonoran Juniper	3 roomblocks
LA 9930	5820	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 6 rooms
LA 9944	5660	Bland	Upper Sonoran Juniper	15-20 rooms
LA 10554	5600	Rio Chiquito	Upper Sonoran Juniper	12-15 masonry rooms
LA 10555	5730	Bland	Upper Sonoran Juniper	5-6 masonry rooms
LA 10557	5720	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 10559	5770	Bland	Upper Sonoran Juniper	5-6 masonry rooms
LA 10560	5760	Bland	Upper Sonoran Juniper	2-3 masonry rooms
LA 10561	5750	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 10566	5640	Bland	Upper Sonoran Juniper	15-20 masonry rooms; lithic scatter†
LA 10567	5700	Rio Chiquito	Upper Sonoran Juniper	15-17 masonry rooms
LA 10568	5670	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock, 12-14 masonry rooms; lithic scatter
LA 10575	5660	Bland	Upper Sonoran Juniper	2-3 masonry rooms
LA 10576	5660	Bland	Upper Sonoran Juniper	6-8 rooms
LA 10577	5640	Bland	Upper Sonoran Juniper	6-8 rooms
LA 10579	5650	Bland	Upper Sonoran Juniper	6-8 masonry rooms
LA 10581	5650	Rio Chiquito	Upper Sonoran Juniper	lithic and ceramic scatter
LA 11630	5840	Bland	Upper Sonoran Juniper	6 masonry rooms
LA 12119	5420	Alamo	Ecotone: Riparian/Arid	1 "L-"shaped roomblock, 20 rooms; no discernable kivas; lithic and ceramic scatter
LA 12120	5380	Lummis	Upper Sonoran Arid	rubble mound, 1 room; trash
LA 12121	5440	Lummis	Upper Sonoran Arid	rubble mound, 10-12 rooms; trash
LA 12123	5470	Lummis	Upper Sonoran Pinyon-Juniper	eroded ruin, 1 room; trash
LA 12126	4501	Lummis	Upper Sonoran Pinyon-Juniper	eroded ruin, 1 room; trash
LA 12127	5450	Lummis	Upper Sonoran Pinyon-Juniper	rubble mound, 2 rooms; trash
LA 12158	5360	RG/WRC	Upper Sonoran Juniper	3 noncontiguous roomblocks, 5-6 masonry terraces

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12175	5550	RG/WRC	Upper Sonoran Juniper	1 "L-"shaped roomblock, 5 rooms
LA 12177	5530	RG/WRC	Upper Sonoran Juniper	3 rooms
LA 12188	5590	Bland	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12192	5590	Medio	Upper Sonoran Juniper	1 masonry room; storage structures; ceramic scatter
LA 12193	5550	Bland	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12196	6540	Water	Upper Sonoran Pinyon	1 "U-"shaped roomblock
LA 12201	6000	Medio	Ecotone: Juniper/Scrub Oak	rubble mound, 1 room; trash
LA 12203	5610	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room; rock shelter; ceramic scatter
LA 12205	5510	Bland	Upper Sonoran Juniper	1 masonry room; ceramic scatter
LA 12111	5700	Sanchez	Upper Sonoran Pinyon-Juniper	2 roomblocks, 100 rooms; trash
LA 12249	6160	Rio Chiquito	Upper Sonoran Juniper	25 rooms; trash
LA 12251	5860	Rio Chiquito	Ecotone: Juniper/Arid	masonry shelter; ceramic scatter
LA 12255	5780	Rio Chiquito	Ecotone: Juniper/Arid	1 "L-"shaped roomblock, 4 masonry rooms; lithic and ceramic scatter
LA 12258	5620	Rio Chiquito	Upper Sonoran Juniper	4 masonry rooms; ceramic scatter
LA 12259	5760	Rio Chiquito	Upper Sonoran Juniper	4 rooms; unspecified structure; cavate; ceramic scatter
LA 12590	7000	Canada del Buey	Upper Sonoran Pinyon	1 rubble mound, 8-12 rooms
LA 12591	7000	Canada del Buey	Upper Sonoran Pinyon	1 rubble mound, 6-8 rooms; no discernable kivas
LA 12592	7000	Canada del Buey	Upper Sonoran Pinyon	1 rubble mound
LA 12593	7000	Canada del Buey	Upper Sonoran Pinyon	2 rubble mounds; lithic and ceramic scatter
LA 12615	6880	Water	Upper Sonoran Pinyon	4 rubble mounds
LA 12625	6880	Potrillo	Upper Sonoran Pinyon	5 roomblocks
LA 12630	6840	Potrillo	Upper Sonoran Pinyon	1 rectangular roomblock
LA 12639	6840	Three Mile Canyon	Upper Sonoran Pinyon	1 rubble mound
LA 12640	6920	Potrillo	Upper Sonoran Pinyon	1 rubble mound
LA 12641	6990	Three Mile	Upper Sonoran Pinyon	8 "L-"shaped roomblocks, 32-64 rooms
LA 12646	6940	Pajarito	Upper Sonoran Pinyon	2 small sites 100m apart
LA 12647	6940	Pajarito	Upper Sonoran Pinyon	1 rubble mound
LA 12660	7000	n.d.	Upper Sonoran Pinyon	2 rubble mounds, 5-6 rooms
LA 12661	6940	n.d.	Upper Sonoran Pinyon	2 rubble mounds, 8-10 rooms; lithic and ceramic scatter
LA 12662	6940	n.d.	Upper Sonoran Pinyon	1 rubble mound, 7-8 masonry rooms
LA 12664	7000	Water	Transition: Ponderosa	plaza site with outlying rooms; check dams
LA 12665	6900	n.d.	Upper Sonoran Pinyon	2 rubble mounds
LA 12666	7000	n.d.	Upper Sonoran Pinyon	1 rubble mound
LA 12667	6925	n.d.	Upper Sonoran Pinyon	4 rubble mounds
LA 12668	7150	Ancho	Upper Sonoran Pinyon	4 noncontiguous mounds of 8-10 rooms
LA 12670	6920	Ancho	Transition: Ponderosa	1 rubble mound
LA 12672	6400	Chaquehui	Upper Sonoran Pinyon	2 rubble mounds
LA 12675	6400	RG/WRC	Upper Sonoran Pinyon	6 rubble mounds
LA 12676	6400	Ancho	Upper Sonoran Pinyon	3 rubble mounds

TABLE III.1A.3 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12677	6400	Ancho	Canyon Riparian/Riparian	1 rubble mound
LA 12680	6400	Ancho	Upper Sonoran Pinyon	1 rubble mound
LA 12681	6550	Water	Upper Sonoran Pinyon	4 rubble mounds
LA 12682	6500	Ancho	Transition: Ponderosa	1 rubble mound
LA 12683	6600	Ancho	Transition: Ponderosa	7 rubble mounds, 22-24 rooms
LA 12684	6500	Ancho	Transition: Ponderosa	4 rubble mounds
LA 12685	6700	Ancho	Ecotone: Pinyon/Ponderosa	3 rubble mounds
LA 12690	6500	Ancho	Upper Sonoran Pinyon	1 rubble mound; isolated structure
LA 12691	6600	Ancho	Transition; Ponderosa	1 rubble mound, 12-15 rooms
LA 12694	6700	Water	Upper Sonoran Pinyon	3 rubble mounds; 1 possible kiva
LA 12701	6500	RG/WRC	Ecotone: Juniper/Juniper-Grassland	scattered masonry shelters; terraces; ditches; petroglyphs
LA 12706	6490	Pajarito	Upper Sonoran Pinyon	10 rooms
LA 12713	6500	n.d.	n.d.	4 rubble mounds; "torreon?"
LA 12714	n.d.	n.d.	n.d.	1 "L-"shaped roomblock
LA 12715	6950	n.d.	Upper Sonoran Pinyon	2 rubble mounds
LA 12716	6880	n.d.	n.d.	1 rubble mound
LA 12717	6600	n.d.	n.d.	1 rectangular roomblock
LA 12719	6680	n.d.	n.d.	3 rubble mounds
LA 12720	6680	n.d.	n.d.	1 rubble mound

TABLE III.1A.4

ANASAZI CLASSIC/P-IV SITES
(A.D. 1325-ca. 1600)

SITE		ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA	5	6640	Tetilla	Upper-Sonoran Juniper Grassland	160 ground floor rooms
LA	7	5520	Santa Fe	Upper Sonoran Juniper-Grassland	large pueblo
LA	35	6000	Rio Chiquito	Upper Sonoran Juniper	large pueblo
LA	42	6410	Los Alamos	Upper Sonoran Pinyon	50 rooms; modern buildings
LA	70	5330	RG below WRC	Upper Sonoran Juniper	230 rooms; 8 kivas; 2 pithouses (?); trash
LA	78	6560	Lummis	Upper Sonoran Pinyon	small village, 0-10 rooms
LA	79	5900	Rio Chiquito	Upper Sonoran Juniper	3 rubble mounds
LA	82	6400	Frijoles	Ecotone: Riparian/Arid	large pueblo
LA	126	5245	Santa Fe	Modern Fields	Cochiti Pueblo
LA	149	5880	Santa Fe	n.d.	n.d.
LA	170	6580	Pajarito	Upper Sonoran Pinyon	500 rooms
LA	174	n.d.	Frijoles	n.d.	indeterminate number of rubble mounds
LA	182	5320	Galisteo	n.d.	eroded ruin
LA	211	6680	Los Alamos	Upper Sonoran Juniper-Grassland	large pueblo; cavates
LA	217	6080	Frijoles	Upper Sonoran Arid	large pueblo
LA	249	5290	RG below WRC	Upper Sonoran Juniper-Grassland	150-200 rooms; 2-4 kivas; unspecified structures
LA	250	6530	Alamo	Upper Sonoran Pinyon	large pueblo
LA	257	6480	Mortandad	Upper Sonoran Pinyon	200 rooms; 2 kivas
LA	370	5400	Medio	Ecotone: Juniper/Pinyon-Juniper	large pueblo
LA	412	5200	Galisteo	n.d.	1 roomblock
LA	591	5300	RG/WRC	Upper Sonoran Juniper	5 rooms; corral
LA	1067	5380	Alamo	Ecotne: Riparian/Arid	4-10 rooms†
LA	1281	5180	Galisteo	n.d.	Santo Domingo Pueblo
LA	2409	6520	RG/WRC	Ecotone: Juniper/Arid	small site; 2 kivas
LA	3443	5650	Rio Chiquito	Upper Sonoran Juniper	150 rooms; no discernable kivas
LA	3444	5620	Rio Chiquito	Upper Sonoran Juniper	21 roomblocks, 800 rooms; 7 kivas
LA	3448	5880	Rio Chiquito	Upper Sonoran Juniper	6 rooms
LA	3751	6540	Lummis	Upper Sonoran Pinyon	n.d.
LA	3767	6840	Lummis	Transition: Ponderosa	n.d.
LA	3768	6840	Lummis	Transition: Ponderosa	n.d.
LA	3770	5820	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA	3771	6600	Lummis	Upper Sonoran Pinyon	n.d.
LA	3777	6940	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA	3793	6850	Lummis	Upper Sonoran Pinyon	n.d.
LA	3795	6970	Lummis	Upper Sonoran Pinyon-Juniper	n.d.
LA	3798	7020	Lummis	Transiton: Ponderosa	n.d.
LA	3801	7200	Lummis	Transition: Ponderosa	n.d.
LA	3825	7100	n.d.	Transition: Ponderosa	n.d.

†conflicting information

TABLE III.1A.4

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 3830	6560	Capulin	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3831	6400	Capulin	Upper Sonoran Pinyon	n.d.
LA 3832	6420	Capulin	Upper Sonoran Pinyon	n.d.
LA 3834	6390	Medio	Upper Sonoran Juniper	n.d.
LA 3835	6390	Capulin	Upper Sonoran Juniper	n.d.
LA 3836	6400	Medio	Upper Sonoran Juniper	n.d.
LA 3838	6360	Capulin	Upper Sonoran Juniper	n.d.
LA 3840	6140	Capulin	Ecotone: Ponderosa/Arid	n.d.
LA 3855	6570	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 4611	7120	Canada del Buey	Transition: Ponderosa	indeterminate number of rooms
LA 4656	n.d.	Pajarito	n.d.	1 rubble mound
LA 4697	7090	Ancho	Transiton: Ponderosa	3 noncontiguous roomblocks; possible kiva
LA 4709	6960	Ancho	Transition: Ponderosa	4 rooms
LA 4715	7020	Los Alamos	Ecotone: Pinyon/Ponderosa	11 rooms
LA 5016	5610	Medio	Upper Sonoran Juniper	1-3 rectangular rooms
LA 5020	5900	Rio Chiquito	Upper Sonoran Juniper	1-3 rectangular rooms
LA 5026	5760	Bland	Upper Sonoran Juniper	1-2 rectangular rooms
LA 5108	5600	Basin No. 19	Upper Sonoran Juniper	possible field house; ceramic scatter
LA 5121	5820	Bland	Upper Sonoran Juniper	possible field house; shrine; lithic and ceramic scatter
LA 5123	5880	Bland	Upper Sonoran Juniper	possible field house; shrine; lithic and ceramic scatter
LA 5124	5860	Bland	Upper Sonoran Juniper	1 roomblock, 2-4 masonry rooms
LA 5125	5860	Bland	Upper Sonoran Juniper	1 roomblock; possible field house; lithic and ceramic scatter
LA 5126	n.d.	Bland	Upper Sonoran Juniper	ceramic scatter
LA 5127	5640	Basin No. 6	Upper Sonoran Juniper	rock shelter
LA 5128	5700	Basin No. 6	Ecotone: Juniper/Juniper-Grassland	3 rooms; rock shelter; petroglyphs
LA 5129	5540	RG/WRC	Upper Sonoran Juniper-Grassland	shrine
LA 5131	5550	RG/WRC	Ecotone: Juniper/Juniper-Grassland	terraces; check dams; lithic scatter
LA 5132	5720	Basin No. 6	Upper Sonoran Juniper-Grassland	2 masonry rooms; field house
LA 5133	5720	Basin No. 6	Ecotone: Juniper/Juniper-Grassland	possible field house; terraces; lithic and ceramic scatter
LA 5134	5700	Basin No. 6	Ecotone: Juniper/Juniper-Grassland	shrine; ceramic scatter
LA 5136	5550	RG/WRC	Upper Sonoran Juniper	2 parallel masonry walls; ceramic scatter; petroglyphs
LA 5137	5700	RG/WRC	Upper Sonoran Juniper	150 rooms; possible field house; check dams; petroglyphs
LA 5138	5560	Basin No. 3	Ecotone: Juniper/Juniper-Grassland	scatter masonry shelters
LA 6170	5240	RG below WRC	Ecotone: Juniper-Grassland/Modern Fields	1 "L-"shaped roomblock, 10-12 rooms; 1-2 kivas; possible pithouses; corrals
LA 6455	5300	RG below WRC	Upper Sonoran Juniper	53 rooms; no kivas
LA 6458	5360	Basin No. 21	Upper Sonoran Juniper	1 rooms; possible field house
LA 6459	5360	Basin No. 21	Upper Sonoran Juniper	lithic and ceramic scatter
LA 6460	5380	Basin No. 21	Upper Sonoran Juniper	4-6 rooms; no discernable kivas

TABLE III.1A.4 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 6463	5310	Tetilla	Upper Sonoran Juniper-Grassland	2-3 rooms
LA 6464	5280	Tetilla	Upper Sonoran Juniper-Grassland	1 room
LA 6981	5990	Santa Fe	n.d.	lithic and ceramic scatter
LA 8731	6250	Santa Fe	n.d.	50-75 rooms; possible kivas; petroglyphs
LA 9154	5340	Santa Fe	Upper Sonoran Juniper-Grassland	3 noncontiguous roomblocks, 75-100 rooms; 2-4 kivas; 4 pitrooms
LA 9783	5520	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 9784	5540	RG/WRC	Upper Sonoran Juniper	1 "L-"shaped roomblock, 3 rooms
LA 9785	5560	Sanchez	Upper Sonoran Juniper	1 room
LA 9787	5600	Bland	Upper Sonoran Juniper	12 rooms
LA 9788	5550	RG/WRC	Upper Sonoran Juniper	1 room
LA 9789	5550	Bland	Upper Sonoran Juniper	1 room
LA 9790	5520	Bland	Upper Sonoran Juniper	1 room
LA 9791	6160	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room
LA 9792	5680	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room
LA 9793	5680	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms; 1 kiva
LA 9794	5680	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9796	5680	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9798	5590	Sanchez	Upper Sonoran Pinyon-Juniper	4 rooms
LA 9802	5570	Sanchez	Upper Sonoran Pinyon-Juniper	terraces
LA 9803	5580	Sanchez	Upper Sonoran Pinyon-Juniper	possible field house; terraces
LA 9805	5760	Medio	Upper Sonoran Juniper	2 rooms
LA 9806	5690	Rio Chiquito	Upper Sonoran Juniper	cavate
LA 9809	5730	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9810	5900	Rio Chiquito	Upper Sonoran Juniper	rock shelter; pictographs
LA 9811	5630	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9813	5680	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9814	5670	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9816	5700	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9818	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9820	5880	Rio Chiquito	Upper Sonoran Juniper	1 room; trash
LA 9823	5860	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9824	5880	Rio Chiquito	Upper Sonoran Juniper	cavate
LA 9825	5880	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9826	5880	Rio Chiquito	Upper Sonoran Juniper	20 rooms
LA 9827	5860	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9828	5860	Rio Chiquito	Upper Sonoran Juniper	lithic and ceramic scatter
LA 9831	5820	Bland	Upper Sonoran Juniper	150 rooms
LA 9832	5740	Rio Chiquito	Upper Sonoran Juniper	10-15 rooms
LA 9833	5690	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9840	5790	Rio Chiquito	Upper Sonoran Juniper	14-15 rooms
LA 9842	5760	Rio Chiquito	Upper Sonoran Juniper	4-6 rooms

TABLE III.1A.4 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9844	5760	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9845	5740	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9847	5740	Rio Chiquito	Upper Sonoran Juniper	1 room; trash
LA 9851	5780	Rio Chiquito	Upper Sonoran Juniper	8 rooms
LA 9852	5760	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9860	5820	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9862	5800	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 30 rooms
LA 9863	5770	Rio Chiquito	Upper Sonoran Juniper	12 rooms
LA 9865	5790	Rio Chiquito	Upper Sonoran Juniper	12 rooms
LA 9867	5750	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 20 rooms
LA 9870	5700	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock, indterminate number of rooms
LA 9871	6860	Bland	Ecotone: Pinyon/Scrub Oak	1 room; trash
LA 9872	6840	Bland	Upper Sonoran Pinyon	1-2 rooms; trash
LA 9873	6850	Bland	Upper Sonoran Pinyon	1-2 rooms; trash
LA 9874	6880	Bland	Upper Sonoran Pinyon	1 room; trash
LA 9875	6880	Bland	Upper Sonoran Pinyon	1 room; trash
LA 9878	5820	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock, 6 rooms
LA 9883	5820	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9884	5800	Rio Chiquito	Upper Sonoran Juniper	1 roombloc, 2-4 rooms
LA 9885	5790	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 12 rooms
LA 9886	5780	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9889	6300	Rio Chiquito	Ecotone: Juniper/Arid	cave
LA 9890	5800	Rio Chiquito	Upper Sonoran Juniper	unspecified structure
LA 9892	5860	Rio Chiquito	Upper Sonoran Juniper	n.d.
LA 9893	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9894	5860	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9897	5800	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 2-3 rooms; lithic and ceramic scatter
LA 9902	5740	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 3 rooms
LA 9904	5810	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9905	5810	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rectangular structures; terraces
LA 9906	5800	Rio Chiquito	Upper Sonoran Juniper	possible hearth; lithic scatter; possible intrusive ceramics
LA 9907	5840	Rio Chiquito	Upper Sonoran Juniper	8 rooms
LA 9908	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9912	5870	Rio Chiquito	Upper Sonoran Juniper	2 parallel roomblocks, indeterminate number of rooms
LA 9915	5860	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9918	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9922	5880	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9923	5860	Rio Chiquito	Upper Sonoran Juniper	10 rooms
LA 9926	5880	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9928	5860	Rio Chiquito	Upper Sonoran Juniper	1 room

TABLE III.1A.4 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9944	5660	Bland	Upper Sonoran Juniper	15-20 rooms
LA 10103	5380	RG/WRC	Ecotone: Juniper/Juniper-Grassland	rock shelter; petroglyphs
LA 10106	5300	RG/WRC	Upper Sonoran Juniper	petroglyphs
LA 10108	5410	RG/WRC	Upper Sonoran Juniper	unspecified structure; petroplyphs
LA 10110	5280	RG/WRC	Upper Sonoran Juniper	1 unspecified structure; 4 hearths; corrals; trash; petroglyphs
LA 10556	5620	Bland	Upper Sonoran Juniper	indeterminate number of rooms
LA 10559	5770	Bland	Upper Sonoran Juniper	5-6 masonry rooms
LA 10562	5640	Basin No. 20	Upper Sonoran Juniper	no structures; ceramic scatter
LA 10567	5700	Rio Chiquito	Upper Sonoran Juniper	15-17 masonry rooms
LA 10568	5670	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock, 12-14 masonry rooms; lithic scatter
LA 10575	5660	Bland	Upper Sonoran Juniper	2-3 masonry rooms
LA 10577	5640	Bland	Upper Sonoran Juniper	6-8 rooms
LA 10578	5600	Rio Chiquito	Upper Sonoran Juniper	2-3 masonry rooms
LA 10581	5650	Rio Chiquito	Upper Sonoran Juniper	lithic ans ceramic scatter
LA 10586	5640	Bland	Upper Sonoran Juniper	terraces; check dam
LA 11583	5470	Santa Fe	Upper Sonoran Juniper-Grassland	lithic and ceramic scatter
LA 11584	5490	Santa Fe	Upper Sonoran Juniper-Grassland	lithic and ceramic scatter
LA 11585	5510	Santa Fe	Upper Sonoran Juniper-Grassland	lithic anc ceramic scatter
LA 11631	5860	Bland	Upper Sonoran Juniper	2 masonry rooms
LA 12117	5460	Alamo	*Ecotone: Riparian/Arud*	rock shelter; sheep pen; lithic and ceramic scatter
LA 12171	5580	RG/WRC	Upper Sonoran Juniper	2 masonry rooms; lithic anc ceramic scatter
LA 12172	5440	Medio	Upper Sonoran Juniper	1 room
LA 12177	5530	RG/WRC	Upper Sonoran Juniper	3 rooms
LA 12178	5560	Frijoles	Ecotone: Juniper/Pinyon-Juniper	1 "L-"shaped roomblock, 3 rooms
LA 12179	5560	Medio	Ecotone: Juniper/Arid	3 masonry rooms
LA 12184	5700	Medio	Ecotone: Juniper/Arid	rock shelter; lithic and ceramic scatter
LA 12187	5520	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room; terraces; lithic and ceramic scatter
LA 12188	5590	Bland	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12191	5500	Medio	Upper Sonoran Juniper	2-3 masonry rooms; ceramic scatter
LA 12192	5590	Medio	Upper Sonoran Juniper	1 masonry room; storage structure; ceramic scatter
LA 12195	5620	Bland	Upper Sonoran Juniper	2 masonry rooms; ceramic scatter
LA 12198	5510	Bland	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12199	5510	RG/WRC	Upper Sonoran Juniper	1 masonry rooms; ceramic scatter
LA 12204	5680	Rio Chiquito	Upper Sonoran Juniper	rock shelter; ceramic scatter
LA 12206	5610	Rio Chiquito	Upper Sonoran Juniper	2 masonry rooms; ceramic scatter
LA 12207	5700	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 12-15 rooms
LA 12210	5630	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12211	5700	Sanchez	Upper Sonoran Pinyon-Juniper	2 roomblocks, 100 rooms; trash
LA 12212	5620	Sanchez	Upper Sonoran Pinyon-Juniper	6 rooms; ceramic scatter
LA 12215	6110	Sanchez	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter

TABLE III.1A.4 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12218	5870	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12220	5720	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room; ceramic scatter
LA 12224	5740	Sanchez	Upper Sonoran Pinyon-Juniper	5 rooms; trash
LA 12225	5610	Rio Chiquito	Upper Sonoran Juniper	1 masonry room
LA 12228	5660	Bland	Upper Sonoran Juniper	1 masonry room
LA 12229	6120	Rio Chiquito	Upper Sonoran Juniper	1 masonry room
LA 12230	5830	Rio Chiquito	Ecotone: Juniper/Arid	scattered masonry shelters
LA 12231	5840	Rio Chiquito	Ecotone: Juniper/Arid	rock shelter; trash
LA 12235	5790	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room; lithic and ceramic scatter
LA 12236	6060	Rio Chiquito	Ecotone: Juniper/Arid	2 masonry rooms; lithic and ceramic scatter
LA 12240	5840	Rio Chiquito	Upper Sonoran Juniper	2 masonry rooms; trash
LA 12241	5730	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; ceramic scatter
LA 12242	5790	Rio Chiquito	Upper Sonoran Juniper	masonry shelter; lithic and ceramic scatter
LA 12244	5790	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12246	5780	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12247	5640	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12253	5850	Rio Chiquito	Ecotone: Juniper/Arid	2 masonry rooms; ceramic scatter
LA 12254	5870	Rio Chiquito	Upper Sonoran Juniper	2 masonry rooms; ceramic scatter
LA 12256	5730	Rio Chiquito	Upper Sonoran Juniper	terraces; lithic and ceramic scatter
LA 12258	5620	Rio Chiquito	Upper Sonoran Juniper	4 masonry rooms; ceramic scatter
LA 12259	5760	Rio Chiquito	Upper Sonoran Juniper	4 rooms; unspecified structures; cavate; ceramic scatter
LA 12443	5790	Rio Chiquito	Upper Sonoran Juniper	3 masonry rooms; lithic and ceramic scatter
LA 12575	5380	Alamo	Upper Sonoran Arid	masonry shelter; trash
LA 12577	5360	Alamo	Ecotone: Riparian/Arid	1 masonry room; lithic and ceramic scatter
LA 12579	5470	RG/WRC	Upper Sonoran Arid	200-400 rooms; kivas; lithic and ceramic scatter
LA 12581	5320	n.d.	n.d.	1 room; lithic and ceramic scatter
LA 12582	5380	n.d.	n.d.	1 room; lithic and ceramic scatter
LA 12584	5360	n.d.	n.d.	1 masonry room; rock shelter; lithic and ceramic scatter
LA 12646	6940	Pajarito	Upper Sonoran Pinyon	2 small sites 100m apart
LA 12660	7000	n.d.	Upper Sonoran Pinyon	2 rubble mounds, 5-6 masonry rooms
LA 12673	6400	Ancho	Upper Sonoran Pinyon	4 rooms
LA 12679	6400	Ancho	Upper Sonoran Pinyon	1 masonry room
LA 12682	6500	Ancho	Transition: Ponderosa	1 rubble mound; 3 rows of rooms
LA 12683	6600	Ancho	Transition: Ponderosa	7 rubble mounds, 22-24 rooms
LA 12684	6500	Ancho	Transition: Ponderosa	4 noncontiguous mounds of 8-10 rooms
LA 12701	6500	RG/WRC	Ecotone: Juniper/Juniper-Grassland	scattered masonry shelters; terraces; ditches; petroglyphs
LA 12713	6500	n.d.	n.d.	4 rubble mounds; "torreon"
LA 12714	n.d.	n.d.	n.d.	1 "L-"shaped room
LA 12719	6680	n.d.	n.d.	3 rubble mounds

TABLE III.1A.5

ANASAZI SITES OF UNKNOWN PHASE

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 115	5900	Santa Fe	n.d.	n.d.
LA 164	5840	Santa Fe	n.d.	n.d.
LA 165	5880	Santa Fe	n.d.	n.d.
LA 1105	6490	Mortandad	Upper Sonoran Pinyon	1 roomblock, 40-45 rooms; 1 kiva
LA 1991	6100	Santa Fe	n.d.	n.d.
LA 3446	5620	Rio Chiquito	Upper Sonoran Juniper	ranchito, 3 rooms; trash
LA 3449	5900	Rio Chiquito	Ecotone: Juniper/Scrub Oak	8-12 rooms
LA 3780	n.d.	Lummis	n.d.	n.d.
LA 4602	6900	Mortandad	Ecotone: Pinyon/Ponderosa	2 rubble mounds
LA 4603	6960	Mortandad	Transition: Ponderosa	3 rubble mounds
LA 4608	6920	Mortandad	Transition: Ponderosa	1 rubble mound
LA 4609	6920	Mortandad	Transition: Ponderosa	4 rubble mounds
LA 4610	6900	Mortandad	Ecotone: Pinyon/Ponderosa	medium-size pueblo
LA 4620	6780	Pajarito	Upper Sonoran Pinyon	1 rectangular roomblock
LA 4621	6780	Pajarito	Upper Sonoran Pinyon	1 "L-"shaped roomblock
LA 4624	6760	Pajarito	Upper Sonoran Pinyon	1 rectangular roomblock, 20 rooms
LA 4629	6700	Pajarito	Ecotone: Pinyon/Ponderosa	2 noncontiguous roomblocks, 2 possible kivas
LA 4630	6700	Pajarito	Upper Sonoran Pinyon	2 rooms
LA 4632	6710	Pajarito	Upper Sonoran Pinyon	1 roomblock, 20 rooms; 1 kiva
LA 4634	7110	Canada del Buey	Transition: Ponderosa	12-13 rooms
LA 4636	6500	Ancho	Upper Sonoran Pinyon	1 rubble mound
LA 4639	6940	Mortandad	Transition: Ponderosa	mound; 2-3 rows of rooms
LA 4642	7010	Canada del Buey	n.d.	1 rectangular roomblock
LA 4649	6400	RG/WRC	Upper Sonoran Arid	4 noncontiguous roomblocks
LA 4653	7300	Water	Transition: Ponderosa	3 rubble mounds
LA 4655	7260	Water	Transition: Ponderosa	10 rooms; possible kiva
LA 4664	7200	Potrillo	Ecotone: Mountain Meadow/Ponderosa	2 rubble mounds
LA 4665	7260	Potrillo	Transition: Ponderosa	2 mounds; outlying room; "torreon"
LA 4665	7110	Potrillo	Transition: Ponderosa	large plaze site; 3 kivas
LA 4674	7110	Potrillo	Transition: Ponderosa	1 rubble mound
LA 4675	7025	Potrillo	Transition: Ponderosa	3 rubble mounds
LA 4678	7080	Water	Transition: Ponderosa	7 noncontiguous roomblocks, 10-15 rooms; lithic and ceramic scatter
LA 4682	7170	Potrillo	Mountain Meadow	1 rubble mound
LA 4684	7180	Three Mile Canyon	Transition: Ponderosa	1 rubble mound
LA 4693	7200	Ancho	Transition: Ponderosa	large plaza site
LA 4694	7220	Ancho	Transition: Ponderosa	mound; possible kiva
LA 4721	6960	Sandia	Transition: Ponderosa	2 rubble mounds
LA 4722	6940	Sandia	Transition: Ponderosa	1 rectangular roomblock 1 kiva

TABLE III.1A.5 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 4725	6920	Sandia	Transition: Ponderosa	small pueblo
LA 5012	5320	RG/WRC	Upper Sonoran Pinyon-Juniper	6 rectangular rooms; ceramic scatter
LA 5110	5700	Bland	Upper Sonoran Juniper	lithic scatter
LA 5135	5680	Basin No. 6	Ecotone: Juniper/Juniper-Grassland	1 masonry room; petroguphs
LA 6175	5220	RG below WRC	Modern Fields	2 pithouse depressions; trash
LA 8681	6400	RG/WRC	Upper Sonoraon Pinyon	21 rooms; 1 kiva
LA 9815	5660	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9939	5610	Basin No. 22	Upper Sonoran Juniper	lithic scatter
LA 9951	5560	Basin No. 24	Upper Sonoran Juniper	lithic scatter
LA 9952	5540	Basin No. 24	Ecotone; Juniper/Juniper-Grassland	lithic and ceramic scatter
LA 9953	5630	RG/WRC	Ecotone: Juniper/Juniper-Grassland	lithic scatter
LA 9956	5720	Rio Chiquito	Upper Sonoran Juniper	lithic scatter possible intrusive ceramics
LA 10582	5580	Bland	Upper Sonoran Juniper	lithaic scatter
LA 12116	5500	Alamo	Ecotone: Riparian/Arid	rock shelter; lithic scatter; modern trash
LA 12122	5430	Lummis	Upper Sonoran Pinyon-Juniper	rubble mound, 2 rooms; no trash
LA 12124	5460	Lummis	Upper Sonoran Pinyon-Juniper	rubble mound, 3 rooms; trash
LA 12125	5460	Lummis	Upper Sonoran Pinyon-Juniper	rubble mound, 3-4 rooms; trash
LA 12132	5950	Santa Fe	Upper Sonoran Juniper-Grassland	1 pithouse
LA 12144	5340	RG/WRC	Upper Sonoran Arid	rubble mound, 2 rooms; trash; petroglyphs
LA 12162	5380	RG/WRC	Upper Sonoran Juniper	scattered masonry shelters, 5 rooms
LA 12170	5570	Medio	Upper Sonoran Juniper	1 room; lithic and ceramic scatter
LA 12194	5780	Medio	Ecotone: Juniper/Scrub Oak/Arid	masonry shelter; lithic and ceramic scatter
LA 12196	5630	Bland	Upper Sonoran Juniper	1 masonry room; ceramic scatter
LA 12202	5960	Medio	Ecotone: Juniper/Scrub Oak	2 masonry rooms; ceramic scatter
LA 12566	5330	RG/WRC	Upper Sonoran Arid	storage structures
LA 12568	5340	RG/WRC	Upper Sonoran Arid	1 room; lithic scatter
LA 12578	5580	Alamo	Ecotone: Riparian/ Arid	4 masonry rooms; lithic and ceramic scatter
LA 12583	5480	n.d.	n.d.	indeterminate number of rooms; storage structure; petroglyphs
LA 12587	6500	Canada del Buey	Upper Sonoran Pinyon	2 noncontiguous roomblocks, 5-6 masonry rooms; lithic and ceramic scatter
LA 12588	6460	Canada del Buey	Upper Sonoran Pinyon	7 rooms; cavate
LA 12589	6900	Sandia	Transition: Ponderosa	3 rooms; cave; petroglyphs
LA 12595	6840	Canada del Buey	Upper Sonoran Pinyon	10-12 rooms
LA 12596	7040	Pajarito	Upper Sonoran Pinyon	4-5 rooms; no discernable kivas
LA 12598	6640	Pajarito	Upper Sonoran Pinyon	8-10 rooms; 1 kiva
LA 12600	6640	Pajarito	Upper Sonoran Pinyon	1 roomblock
LA 12604	6580	Sandia	Upper Sonoran Pinyon	30 rooms; trail
LA 12605	6550	Los Alamos	Upper Sonoran Pinyon	indeterminate number of rooms; terraces
LA 12606	6630	Los Alamos	Upper Sonoran Pinyon	1 "L-"shaped roomblock
LA 12607	6520	Los Alamos	Upper Sonoran Pinyon	2 noncontiguous roomblocks
LA 12608	6520	Los Alamos	Upper Sonoran Pinyon	2 noncontiguous roomblocks, 5-6 rooms

TABLE III.1A.5 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12609	6800	Mortandad	n.d.	3 rubble mounds, 100 rooms; noncontiguous cliff dwellings; 1 kiva
LA 12612	6760	Mortandad	Upper Sonoran Pinyon	26 rooms; cavate
LA 12613	6710	Pajarito	Upper Sonoran Pinyon	3 noncontiguous roomblocks
LA 12614	6720	Pajarito	Upper Sonoran Pinyon	2 noncontiguous roomblocks
LA 12616	6820	Potrillo	Upper Sonoran Pinyon	large site; possible kiva
LA 12624	6780	Water	Upper Sonoran Pinyon	1 roomblock
LA 12626	6920	Ancho	Upper Sonoran Pinyon	1 roomblock
LA 12629	6840	Potrillo	Upper Sonoran Pinyon	2 rubble mounds
LA 12636	6730	Pajarito	Upper Sonoran Pinyon	2 rubble mounds
LA 12637	6740	Pajarito	Upper Sonoran Pinyon	1 rubble mound, 12 rooms
LA 12643	7020	Potrillo	Upper Sonoran Pinyon	2 rubble mounds
LA 12648	n.d.	n.d.	Upper Sonoran Pinyon	1 linear roomblock
LA 12655	7200	Water	Upper Sonoran Pinyon	50 rooms; cairns
LA 12671	6950	Ancho	Transition: Ponderosa	1 rubble mound
LA 12689	6300	Ancho	Transition: Ponderosa	cave
LA 12702	6600	Ancho	Upper Sonoran Pinyon	20 rooms; cavate
LA 12712	n.d.	n.d.	n.d.	2 noncontiguous roomblocks
LA 12718	6680	n.d.	n.d.	2 noncontiguous roomblocks
LA 12725	7000	n.d.	Upper Sonoran Pinyon	possible kiva; cavate

TABLE III.1A.6

HISTORIC PERIOD SITES
(ca. A. D. 1540-present)

SITE	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 34	1660-1680	5320	Santa Fe	Upper Sonoran Juniper-Grassland	hacienda, 18 rooms
LA 42	P-V	6410	Los Alamos	Upper Sonoran Pinyon	modern buildings
LA 70	P-V	5330	RG below WRC	Upper Sonoran Juniper	230 rooms; 8 kivas; 2 pithouses; trash
LA 79	P-V	5900	Rio Chiquito	Upper Sonoran Juniper	3 rubble mounds
LA 82	P-V	6400	Frijoles	Ecotone: Riparian/Arid	large site
LA 84	P-V	6320	Rio Chiquito	Ecotone: Juniper/Scrub Oak	120 rooms
LA 115	18th century	5900	Santa Fe	n.d.	n.d.
LA 126	P-V	5245	Santa Fe	Modern Fields	present site of Cochiti Pueblo
LA 164		5840	Santa Fe	n.d.	n.d.
LA 165	18th century	5880	Santa Fe	n.d.	n.d.
LA 170	P-V	6580	Pajarito	Upper Sonoran Pinyon	500 rooms
LA 247		5300	RG below WRC	Upper Sonoran Juniper	8 roomblocks, 75-100 rooms; 3 (?) kivas
LA 249		5290	RG below WRC	Upper Sonoran Juniper-Grassland	150-200 rooms; 2-4 kivas; unspecified structures
LA 265	18th century	5275	RG below WRC	Upper Sonoran Juniper Grassland	2-4 rooms; field house; ceramic scatter
LA 266	P-V	5620	Santa Fe	Upper Sonoran Arid	n.d.
LA 295	P-V	6540	Rio Chiquito	Ecotone: Juniper/Scrub Oak	112 ground floor rooms; 1 kiva
LA 591	17th century	5300	RG/WRC	Upper Sonoran Juniper	5 rooms; corral
LA 1098	18th century	5950	Santa Fe	n.d.	house; ceramic scatter
LA 1281	P-V	5180	Galisteo	n.d.	present site of Santo Domingo Pueblo
LA 1991	18th century	6100	Santa Fe	n.d.	n.d.
LA 3443	P-V	5650	Rio Chiquito	Upper Sonoran Juniper	150 rooms; no discernable kivas
LA 3445		5900	Rio Chiquito	Upper Sonoran Juniper	present site of village of Canada
LA 3446		5620	Rio Chiquito	Upper Sonoran Juniper	ranchito, 3 rooms; trash
LA 3449		5900	Rio Chiquito	Ecotone: Juniper/Scrub Oak	8-12 rooms
LA 3451	17th/18th century	6040	Rio Chiquito	Upper Sonoran Scrub Oak	4 rooms
LA 3452		5620	Rio Chiquito	Upper Sonoran Juniper	ranchito; trash
LA 3652	17th/18th century	5620	Rio Chiquito	Upper Sonoran Juniper	ranchito
LA 4660		6900	Pajarito	n.d.	1 masonry room; ramada
LA 5015		5320	RG/WRC	Upper Sonoran Juniper	1 oval room
LA 5128		5700	Basin No. 6	Ecotone: Juniper/Juniper-Grassland	3 rooms; rock shelter; petroglyphs
LA 5131	P-V	5550	RG/WRC	Ecotone: Juniper/Juniper-Grassland	terraces; check dam; lithic scatter
LA 5136		5550	RG/WRC	Upper Sonoran Juniper	2 parallel masonry walls; ceramic scatter; petroglyphs
LA 5178	P-V	5270	Galisteo	n.d.	town
LA 6169		5240	RG below WRC	Ecotone: Juniper-Grassland/Modern Fields	1 "U-"shaped roomblock, 15-20 rooms; 1 kiva; possible pithouses; corrals; two distinct components
LA 6170	20th century	5240	RG below WRC	Ecotone: Juniper-Grassland/Modern Fields	1 "L-"shaped roomblock, 10-12 rooms; 1-2 kivas; possible pithouses; corrals

TABLE III.1A.6 (con't)

SITE	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 6176	20th century	5220	RG below WRC	Ecotone: Juniper-Grassland/Modern Fields	field house
LA 6178	18th century	5300	RG below WRC	Upper Sonoran Juniper	rectangular structure; "torreon"
LA 6179	20th century	5260	RG below WRC	Ecotone: Juniper/Modern Fields	farmhouse
LA 6180	20th century	5260	RG below WRC	Ecotone: Juniper/Modern Fields	farmhouse, 2 rooms
LA 6181	20th century	5260	RG below WRC	Ecotone: Juniper/Modern Fields	farmhouse
LA 6182	20th century	5260	RG below WRC	Ecotone: Juniper/Modern Fields	farmhouse
LA 6793	20th century	5300	RG below WRC	Upper Sonoran Juniper	4 masonry rooms
LA 9137	20th century?	5300	Santa Fe	Upper Sonoran Juniper-Grassland	rock shelter
LA 9138	18th century	5300	RG/WRC	Upper Sonoran Juniper	5 roomblocks, 7 masonry rooms; 1 depression; isolated wall; lithic and ceramic scatter; petroglyphs
LA 9139	post 1680	5280	RG/WRC	Upper Sonoran Juniper	1 roomblock, 1 masonry room; 1 hearth
LA 9141		5300	Santa Fe	Upper Sonoran Juniper-Grassland	cave
LA 9810	P-V	5900	Rio Chiquito	Upper Sonoran Juniper	rock shelter; pictographs
LA 9817	P-V	5780	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9818	P-V	5840	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9819	P-V	5880	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms; terraces
LA 9820		5880	Rio Chiquito	Upper Sonoran Juniper	1 room; trash
LA 9821	P-V	5860	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9822	P-V	5880	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9829	P-V	5840	Rio Chiquito	Upper Sonoran Juniper	7 rooms
LA 9834	P-V	5580	Rio Chiquito	Upper Sonoran Juniper	6 rooms
LA 9836		5580	Rio Chiquito	Upper Sonoran Juniper	3 rooms; terraces
LA 9837	P-V	5670	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9839	P-V	5780	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9848	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 8-12 rooms
LA 9849	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	4 rooms
LA 9850	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock, 15 rooms
LA 9853	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	4 rooms
LA 9854	P-V	5740	Rio Chiquito	Upper Sonoran Juniper	1 "U-"shaped roomblock, 4-6 rooms
LA 9855	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 8-12 rooms
LA 9856	P-V	5720	Rio Chiquito	Upper Sonoran Juniper	1-2 rooms
LA 9859	P-V	5880	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms; additional rock alignments
LA 9861	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 2 rooms
LA 9864	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	rectangular structure
LA 9868	P-V	5730	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9868	P-V	5720	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9876	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9877	P-V	5830	Rio Chiquito	Upper Sonoran Juniper	3-6 rooms
LA 9878	P-V	5820	Rio Chiquito	Upper Sonoran Juniper	1 "T-"shaped roomblock, 6 rooms
LA 9879	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	2 roomblocks, 9 rooms; trash
LA 9880		5800	Rio Chiquito	Upper Sonoran Juniper	1 rectangular room

TABLE III.1A.6 (con't)

SITE	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 9881	P-V	5820	Rio Chiquito	Upper Sonoran Juniper	12 rooms
LA 9882	P-V	5830	Rio Chiquito	Upper Sonoran Juniper	indeterminate number of rooms
LA 9883	P-V	5820	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9884	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 2-4 rooms
LA 9885		5790	Rio Chiquito	Upper Sonoran Juniper	1 roomblock, 12 rooms
LA 9888	P-V	5760	Rio Chiquito	Upper Sonoran Juniper	1 room; trash
LA 9890		5800	Rio Chiquito	Upper Sonoran Juniper	unspecified structure
LA 9892	P-V	5860	Rio Chiquito	Upper Sonoran Juniper	n.d.
LA 9897		5800	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 2-3 rooms; lithic and ceramic scatter
LA 9898	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	5 rooms
LA 9899	P-V	5800	Rio Chiquito	Upper Sonoran Juniper	2-3 rooms
LA 9900	P-V	5710	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 4 rooms
LA 9912	P-V	5870	Rio Chiquito	Upper Sonoran Juniper	2 parallel roomblocks
LA 9917	P-V	5730	Rio Chiquito	Upper Sonoran Juniper	1 "L-"shaped roomblock, 4-5 rooms
LA 9920	P-V	5880	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9922	P-V	5880	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 10103	P-V	5380	RG/WRC	Ecotone: Juniper/Juniper-Grassland	rock shelter; petroglyphs
LA 10104		5400	RG/WRC	Ecotone: Juniper/Juniper-Grassland	petroglyphs
LA 10106	P-V	5300	RG/WRC	Upper Sonoran Juniper	petroglyphs
LA 10108	P-V	5410	RG/WRC	Upper Sonoran Juniper	unspecified structure
LA 10110	P-V	5280	RG/WRC	Upper Sonoran Juniper	1 structure; 1 corral; 4 hearths; trash; petroglyphs
LA 10111	20th century?	5280	RG/WRC	Upper Sonoran Juniper	1 roomblock, 2 (?) rooms; corral; 3 hearths; trash; petroglyphs
LA 10113		5590	Basin No. 24	Upper Sonoran Juniper	petroglyphs
LA 10116		5360	RG/WRC	Ecotone: Juniper/Arid	1 masonry room; ceramic scatter
LA 12210	P-V	5630	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12113		5380	RG/WRC	Upper Sonoran Arid	rock shelter; sheep pen
LA 12114		5370	RG/WRC	Upper Sonoran Arid	sheep pen; lithic scatter
LA 12115		5800	Alamo	Upper Sonoran Arid	rock shelter; sheep pen; lithic scatter; pictographs
LA 12116		5500	Alamo	Ecotone: Riparian/Arid	rock shelter; lithic scatter
LA 12117		5460	Alamo	Ecotone: Riparian/Arid	rock shelter; sheep pen; lithic and ceramic scatter
LA 12130	17th/18th century?	5890	Santa Fe	Upper Sonoran Juniper-Grassland	hacienda, 7 masonry rooms
LA 12161	18th century	5320	RG/WRC	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12162		5380	RG/WRC	Upper Sonoran Juniper	5 scattered masonry shelters
LA 12165		5450	Frijoles	Upper Sonoran Juniper	1 room; cairn
LA 12166	17th century	5500	RG/WRC	Upper Sonoran Juniper	2 masonry rooms
LA 12183	17th century	5700	Medio	Upper Sonoran Juniper	rock shelter; lithic and ceramic scatter
LA 12184		5700	Medio	Ecotone: Juniper/Arid	rock shelter; lithic and ceramic scatter

TABLE III.1A.6 (con't)

SITE	PHASE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12185	18th century	5700	Medio	Ecotone: Juniper/Arid	rock shelter; lithic and ceramic scatter
LA 12186		5630	Medio	Upper Sonoran Juniper	2 masonry rooms
LA 12200	17th century?	5510	RG/WRC	Upper Sonoran Juniper	rubble mound, 2 rooms; ceramic scatter
LA 12202	16th/17th century	5960	Medio	Ecotone: Juniper/Scrub Oak	2 masonry rooms; ceramic scatter
LA 12210	17th century	5630	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic and ceramic scatter
LA 12213		5700	Sanchez	Upper Sonoran Pinyon-Juniper	isolated wall; no cultural debris
LA 12217		5920	Rio Chiquito	Ecotone: Juniper/Arid	scattered masonry shelters
LA 12219		5890	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; ceramic scatter
LA 12221		5550	Sanchez	Upper Sonoran Pinyon-Juniper	sheep pen
LA 12231	P-V	5840	Rio Chiquito	Ecotone: Juniper/Arid	rock shelter; trash
LA 12239	18th century	6090	Rio Chiquito	Ecotone: Juniper/Arid	rock shelter; ash deposit; trash
LA 12247	18th century	5640	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; ceramic scatter
LA 12248		5780	Rio Chiquito	Upper Sonoran Juniper	2 masonry rooms; no cultural debris
LA 12249	17th century	6160	Rio Chiquito	Upper Sonoran Juniper	25 rooms; trash
LA 12256	P-V	5730	Rio Chiquito	Upper Sonoran Juniper	terraces; lithic and ceramic scatter
LA 12257	18th century	5690	Rio Chiquito	Upper Sonoran Juniper	4-8 masonry rooms; trash
LA 12575		5380	Alamo	Upper Sonoran Arid	masonry shelter; trash
LA 12584		5360	n.d.	n.d.	1 masonry room; rock shelter; lithic and ceramic scatter
LA 12602	20th century	6860	Sandia	Ecotone: Pinyon/Ponderosa	isolated wall

TABLE III.1A.7

SITES OF UNKNOWN TEMPORAL PERIOD

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 3775	6500	Lummis	Ecotone: Juniper/Pinyon-Juniper	n.d.
LA 3792	6660	Capulin	Upper Sonoran Pinyon	n.d.
LA 3807	6840	Lummis	Transition: Ponderosa	n.d.
LA 3812	6820	Lummis	Upper Sonoran Pinyon	n.d.
LA 3824	n.d.	Lummis	n.d.	n.d.
LA 3839	6400	Capulin	Upper Sonoran Pinyon	n.d.
LA 3871	7320	Frijoles	Ecotone: Pinyon-Juniper/Ponderosa	n.d.
LA 4604	6940	Mortandad	Ecotone:Pinyon/Ponderosa	1 rubble mound
LA 4605	6970	Mortandad	Transition: Ponderosa	1 rubble mound
LA 4606	6960	Cedro	Transition: Ponderosa	1 rubble mound
LA 4612	6880	Canada del Buey	Transition: Ponderosa	n.d.
LA 4613	6840	Canada del Buey	Transition: Ponderosa	b.d.
LA 4614	6840	Canada del Buey	Ecotone: Pinyon/Ponderosa	n.d.
LA 4615	6840	Canada del Buey	Ecotone: Pinyon/Ponderosa	n.d.
LA 4616	6760	Canada del Buey	Ecotone: Pinyon/Ponderosa	n.d.
LA 4617	6800	Pajarito	Ecotone: Pinyon/Ponderosa	n.d.
LA 4618	6800	Pajarito	Transition: Ponderosa	n.d.
LA 4619	6800	Pajarito	Transition: Ponderosa	n.d.
LA 4620	6800	Pajarito	Ecotone: Pinyon/Ponderosa	n.d.
LA 4621	6790	Pajarito	Transition: Ponderosa	n.d.
LA 4638	7170	Canada del Buey	Transition: Ponderosa	n.d.
LA 4640	6960	Cedro	Transition: Ponderosa	n.d.
LA 4641	7030	Canada del Buey	n.d.	n.d.
LA 4643	7020	Canada del Buey	n.d.	n.d.
LA 4650	6450	Chaquehui	n.d.	2 rubble mounds
LA 4651	6400	Ancho	Upper Sonoran Pinyon	2 noncontiguous roomblocks
LA 4654	7240	Water	Transition: Ponderosa	2 rubble mounds
LA 4657	n.d.	Pajarito	n.d.	1 masonry room
LA 4658	7100	Pajarito	n.d.	n.d.
LA 4658	6420	Chaquehui	Upper Sonoran Pinyon	n.d.
LA 4659	7100	Pajarito	n.d.	n.d.
LA 4661	7060	Pajarito	Upper Sonoran Pinyon	2 rubble mounds
LA 4662	6920	Potrillo	n.d.	n.d.
LA 4663	7220	Water	Mountain meadow	n.d.
LA 4667	7100	Water	Transition: Ponderosa	n.d.
LA 4668	7140	Potrillo	Transition: Ponerosa	n.d.
LA 4669	7140	Potrillo	Transition: Ponderosa	2 masonry rooms
LA 4670	7130	Potrillo	Transition: Ponderosa	4 noncontiguous roomblocks, 4-16 rooms
LA 4671	7100	Los Alamos	n.d.	1 rubble mound, 4 rooms
LA 4672	7120	Potrillo	Transition: Ponderosa	1 rubble mound, 4 rooms

TABLE III.1A.6 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 4673	7100	Potrillo	Transition: Ponderosa	1 rubble mound
LA 4676	7120	Water	Transition: Ponderosa	n.d.
LA 4677	7100	Water	Transition: Ponderosa	n.d.
LA 4679	7150	Potrillo	Transition: Ponderosa	1 rubble mound, 4-6 rooms
LA 4680	7150	Potrillo	Mountain Meadow	1 masonry room
LA 4681	7150	Potrillo	Mountain Meadow	1 rubble mound
LA 4683	7140	Potrillo	Mountain Meadow	n.d.
LA 4685	7150	Three Mile Canyon	Transition: Ponderosa	1 rubble mound; "torreon"
LA 4686	7200	Potrillo	Mountain Meadow	1 rubble mound
LA 4687	7160	Ancho	Transition: Ponderosa	n.d.
LA 4688	7220	Ancho	Transition: Ponderosa	1 rubble mound
LA 4689	7210	Ancho	Transition: Ponderosa	1 rubble mound, 4 rooms
LA 4690	7210	Ancho	Transition: Ponderosa	1 rubble mound, 3-4 rooms
LA 4691	7160	Ancho	Transition: Ponderosa	2 roomblocks, 6-7 rooms
LA 4692	7200	Ancho	Transition: Ponderosa	n.d.
LA 4695	7120	Ancho	Transition: Ponderosa	1 rubble mound, 4-6 rooms
LA 4699	7040	Ancho	Transition: Ponderosa	2 noncontiguous roomblocks, 8 rooms
LA 4700	7180	Ancho	Transition: Ponderosa	n.d.
LA 4701	7170	Ancho	Transition: Ponderosa	1-2 rooms
LA 4702	7150	Frijoles	Transition: Ponderosa	1-2 rooms
LA 4703	7140	Ancho	Transition: Ponderosa	n.d.
LA 4705	7150	Ancho	Transition: Ponderosa	1-2 rooms
LA 4706	7100	Ancho	Transition: Ponderosa	6-8 rooms
LA 4707	7100	Ancho	Transition: Ponderosa	n.d.
LA 4710	n.d.	n.d.	n.d.	n.d.
LA 4712	7000	Sandia	Transition: Ponderosa	n.d.
LA 4719	6960	Sandia	Transition: Ponderosa	10-12 rooms
LA 4720	n.d.	Los Alamos	Ecotone: Pinyon/Ponderosa	3-4 rooms
LA 4723	6920	Sandia	Transition: Ponderosa	n.d.
LA 4728	6950	Mortandad	Transition Ponderosa	1 room
LA 5013	5300	RG/WRC	Upper Sonoran Juniper	1 oval room; no cultural debris
LA 5017	5360	Capulin	Upper Sonoran Pinyon-Juniper	3 scattered masonry structures; no cultural debris
LA 5019	5880	Rio Chiquito	Upper Sonoran Juniper	1-4 rooms
LA 5024	5800	Rio Chiquito	Upper Sonoran Juniper	rectangular structure; no cultural debris
LA 5025	5800	Rio Chiquito	Upper Sonoran Juniper	circular ring of cobbles; no cultural debris
LA 5095	5540	Bland	Upper Sonoran Juniper	4 scattered masonry shelters; possible hearths; pictographs
LA 5096	5540	Bland	Upper Sonoran Juniper	1 masonry room; possible hearth; lithic scatter; pictographs
LA 5104	5500	Basin No. 22	Ecotone: Juniper/Juniper-Grassland	masonry shelter
LA 5106	5560	Bland	Upper Sonoran Juniper Grassland	rock shelter; no cultural debris
LA 5109	5700	Santa Cruz	Upper Sonoran Juniper	petroglyphs

TABLE III.1A.7 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 5118	5560	Bland	Upper Sonoran Juniper	rock shelter; no cultural debris
LA 6296	6150	Santa Fe	n.d.	shrine; petroglyphs
LA 6297	6040	Santa Fe	n.d.	shrine
LA 6298	6060	Santa Fe	n.d.	petroglyphs
LA 6457	5380	RG below WRC	Upper Sonoran Juniper	1 room; lithic scatter
LA 9782	5500	RG/WRC	Upper Sonoran Juniper	terraces
LA 9786	5560	Sanchez	Upper Sonoran Juniper	1 room; no cultural debris
LA 9795	5680	Bland	Upper Sonoran Juniper	no cultural debris; petroglyphs
LA 9797	5660	Bland	Upper Sonoran Juniper	no cultural debris; petroglyphs
LA 9800	5710	Sanchez	Ecotone: Juniper/Arid	no cultural debris; petroglyphs
LA 9804	5660	Medio	Ecotone: Juniper/Pinyon-Juniper	1 room
LA 9807	5700	Rio Chiquito	Upper Sonoran Juniper	3 rooms
LA 9812	5620	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9835	5590	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9846	5740	Rio Chiquito	Upper Sonoran Juniper	rock compound
LA 9857	5760	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9858	5760	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9866	5770	Rio Chiquito	Upper Sonoran Juniper	rectangular structures
LA 9887	5780	Rio Chiquito	Upper Sonoran Juniper	2 rooms; no cultural debris
LA 9896	5800	Rio Chiquito	Upper Sonoran Juniper	1 room
LA 9903	5760	Rio Chiquito	Upper Sonoran Juniper	2 rooms
LA 9909	5940	Rio Chiquito	Upper Sonoran Juniper	1 room; no cultural debris
LA 9914	5900	Rio Chiquito	Upper Sonoran Juniper	rectangular structure; no trash
LA 10102	5300	Santa Fe	Upper Sonoran Juniper	petroglyphs
LA 10105	5350	RG/WRC	Ecotone: Juniper/Juniper-Grassland	petroglyphs
LA 10107	5260	Basin No. 2	Upper Sonoran Juniper	3-4 masonry rooms; petroglyphs
LA 10109	5330	RG/WRC	Upper Sonoran Juniper	petroglyphs
LA 10114	5340	RG/WRC	Upper Sonoran Pinyon-Juniper	unspecified structure; petroplyphs
LA 10115	5380	RG/WRC	Upper Sonoran Pinyon-Juniper	petroglyphs
LA 10584	5580	Rio Chiquito	Upper Sonoran Juniper	petroglyphs
LA 10585	5570	Canada del Buey	Upper Sonoran Juniper	rock shelter; petroglyphs
LA 10592	5560	Basin No. 24	Ecotone: Juniper/Juniper-Grassland	shrine; rockline
LA 10942	6200	Frijoles	Ecotone: Riparian/Ponderosa	n.d.
LA 12112	5380	RG/WRC	Ecotone: Pinyon/Juniper	n.d.
LA 12118	5520	Alamo	Upper Sonoran Arid	rubble wall; shrine
LA 12129	5340	Alamo	Upper Sonoran Scrub Oak	n.d.
LA 12157	5400	Sanchez	Ecotone: Juniper/Pinyon-Juniper	masonry shelter
LA 12159	5380	Sanchez	Ecotone: Juniper/Pinyon-Juniper	rock shelter
LA 12160	5300	RG/WRC	Upper Sonoran Juniper	1 masonry room; no cultural debris
LA 12164	5300	RG/WRC	Upper Sonoran Arid	storage structure
LA 12168	5400	RG/WRC	Upper Sonoran Juniper	petroglyphs
LA 12173	5740	RG/WRC	Upper Sonoran Juniper	rock shelter; no cultural debris

TABLE III.1A.7 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12174	5580	Frijoles	Upper Sonoran Juniper	terraces
LA 12176	5590	Medio	Upper Sonoran Juniper	rubble mouhd, 2 rooms; lithic scatter
LA 12180	5570	Sanchez	Upper Sonoran Pinyon-Juniper	1 room; no cultural debris; terraces
LA 12181	5900	Medio	Ecotone: Juniper/Arid	petroglyphs
LA 12182	5800	Medio	Ecotone: Juniper/Arid	rock shelter; no cultural debris
LA 12189	5620	Sanchez	Upper Sonoran Pinyon-Juniper	masonry shelter; no cultural debris
LA 12194	5780	Medio	Ecotone: Juniper/Scrub Oak/Arid	masonry shelter
LA 12197	5570	Bland	Upper Sonoran Juniper	petroglyphs
LA 12208	5750	Sanchez	Ecotone: Juniper/Arid	petroglyphs
LA 12209	5590	Sanchez	Upper Sonoran Pinyon-Juniper	petroglyphs
LA 12214	6100	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; no cultural debris
LA 12216	5680	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; lithic scatter
LA 12222	5670	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room
LA 12223	5710	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonry room
LA 12226	5620	Rio Chiquito	Upper Sonoran Juniper	3 masonry rooms
LA 12232	6090	Rio Chiquito	Upper Sonoran Juniper	isolated wall
LA 12233	5970	Rio Chiquito	Upper Sonoran Juniper	1 masonry room; no cultural debris
LA 12234	6700	Sanchez	Upper Sonoran Pinyon-Juniper	1 masonru room; lithic scatter
LA 12237	5860	Rio Chiquito	Ecotone: Juniper/Arid	rock shelter; no cultural debris
LA 12238	5840	Rio Chiquito	Ecotone: Juniper/Arid	1 masonry room; no cultural debris
LA 12245	5730	Rio Chiquito	Upper Sonoran Juniper	terraces
LA 12567	5360	RG/WRC	Upper Sonoran Arid	1 masonry room
LA 12576	5400	Alamo	Ecotone: Riparian/Arid	rectangular structure; shrine; lithic scatter
LA 12594	6880	Canada del Buey	Upper Sonoran Pinyon	1 rubble mound
LA 12597	6880	Pajarito	Upper Sonoran Pinyon	1 rubble mound, 8-10 rooms
LA 12599	6630	Canada del Buey	Upper Sonoran Pinyon	4 noncontiguous rooomblocks, 16-40 rooms; shrine
LA 12601	n.d.	Mortandad	Upper Sonoran Pinyon	1 rubble mound
LA 12603	6740	Sandia	Upper Sonoran Pinyon	2 noncontiguous roomblocks, 6-8 rooms
LA 12617	6820	Potrillo	Upper Sonoran Pinyon	1 rubble mound
LA 12618	6820	Potrillo	Upper Sonoran Pinyon	1 rubble mound
LA 12619	6760	Water	Upper Sonoran Pinyon	3 rubble mounds
LA 12620	6720	Potrillo	Upper Sonoran Pinyon	7 rubble mounds
LA 12621	6740	Water	Upper Sonoran Pinyon	2 rubble mounds
LA 12622	6750	Water	Upper Sonoran Pinyon	1 rubble mound
LA 12623	6760	Water	Upper Sonoran Pinyon	1 rectangular roomblock
LA 12627	6840	Pajarito	Upper Sonoran Pinyon	3 rubble mounds
LA 12628	6860	Potrillo	Upper Sonoran Pinyon	1 rubble mound
LA 12631	6780	Potrillo	Upper Sonoran Pinyon	trap
LA 12632	6880	Potrillo	Upper Sonoran Pinyon	2 rubble mounds
LA 12633	6820	Pajarito	Upper Sonoran Pinyon	2 rubble mounds
LA 12634	6820	Pajarito	Upper Sonoran Pinyon	1 rubble mound

TABLE III.1A.7 (con't)

SITE	ELEV.	DRAINAGE	ECOLOGICAL COMMUNITY	DESCRIPTION
LA 12635	6760	Pajarito	Upper Sonoran Pinyon	1 rubble mound, 2 rooms (?)
LA 12638	6750	Pajarito	Upper Sonoran Pinyon	2 rubble mounds
LA 12642	n.d.	Sanchez	Upper Sonoran Pinyon	n.d.
LA 12644	7000	Water	Upper Sonoran Pinyon	15 rooms; lithic scatter
LA 12645	7340	Pajarito	Transition: Ponderosa	isolated wall
LA 12649	7050	Potrillo	Upper Sonoran Pinyon	2 rubble mounds
LA 12650	n.d.	n.d.	Upper Sonoran Pinyon	small site (torreon-like)
LA 12651	7100	n.d.	Upper Sonoran Pinyon	1 rubble mound; isolated wall
LA 12652	7100	n.d.	Upper Sonoran Pinyon	masonry room (?)
LA 12653	7100	n.d.	n.d.	3 rubble mounds, 8-9 rooms; 2 distinct components
LA 12654	7350	Pajarito	Transition: Ponderosa	small site (torreon-like)
LA 12656	7300	Water	Upper Sonoran Pinyon	4 rooms
LA 12657	7200	Ancho	Transition: Ponderosa	7 rubble mounds, indeterminate number of rooms; "torreon"
LA 12663	6400	Canada del Buey	Upper Sonoran Pinyon	shrine; petroglyphs
LA 12669	n.d.	Ancho	Transition: Ponderosa	n.d.
LA 12674	6650	Ancho	Transitiion: Ponderosa	1 rubble mound, 2 rooms
LA 12678	6400	Ancho	Upper Sonoran Pinyon	2 contiguous rooms
LA 12687	6860	Ancho	Transition: Ponderosa	1 rubble mound; 3-4 rooms
LA 12692	6720	Water	Transition: Ponderosa	1-2 masonry rooms
LA 12693	6720	Ancho	Transition: Ponderosa	pit
LA 12695	6420	Ancho	Upper Sonoran Pinyon	1 room
LA 12697	6400	Water	Upper Sonoran Pinyon	2 rooms
LA 12698	6400	Water	Upper Sonoran Pinyon	scattered masonry shelters; terraces
LA 12699	6500	Water	Ecotone: Pinyon/Juniper	2 noncontiguous roomblocks, 11-12 rooms
LA 12703	6800	Water	Upper Sonoran Pinyon	petroglyphs
LA 12704	6700	n.d.	n.d.	trap
LA 12705	7375	Pajarito	Upper Sonoran Pinyon	rubble mound; "torreon"
LA 12708	6600	Pajarito	Upper Sonoran Pinyon	shrine; check dams; petroglyphs
LA 12709	6600	Water	Upper Sonoran Pinyon	2 noncontiguous roomblocks
LA 12722	7080	n.d.	Upper Sonoran Pinyon	6-8 rooms; "torreon"
LA 12723	6875	n.d.	Upper Sonoran Pinyon	5 rooms
LA 12724	6450	n.d.	Upper Sonoran Pinyon	shrine

III.2
An Historical Perspective on Adaptive Systems in the Middle Rio Grande

EMILY K. ABBINK and JOHN R. STEIN

INTRODUCTION

The Historic Period of the Southwest (A.D. 1540 to present) is characterized by considerable societal complexity and rapid change. During this period, much of the structural complexity in social, economic and political behavior of human populations is a function of cultural diversity which is manifest among the Puebloan, Apachean, Hispanic and Anglo inhabitants of the region. Changes in the organizational relationships among these populations at local and regional levels can be seen as a function of their articulation with Hispanic and Anglo nation-state political and economic systems through time.

With respect to New Mexico, the city of Santa Fe served as the primary political and commercial center from which both Hispanic and Anglo nation-state systems attempted to exercise control over inhabitants of surrounding regions. The study area, while situated in close spatial proximity to Santa Fe, encompasses a geographical area largely peripheral to this and other major population centers throughout the Historic Period.

White Rock Canyon, in particular, constituted a geographical boundary between two Puebloan linguistic and settlement districts along the Rio Grande Valley—the Tewa to the north and Keresan to the south; and later this region constituted a similar boundary between the Hispanic Rio Arriba settlements to the north and Rio Abajo settlements to the south. White Rock Canyon, and the Jemez Mountains directly west of the canyon, constituted an operational boundary between the Hispanic and Puebloan settlements along the Rio Grande and Navajo populations to the west; and as late as 1943, a portion of the study area was selected because of its perceived isolation as the site of the Los Alamos research community.

It was, therefore, expected that the study area potentially would exhibit an archeological record reflecting to some degree the activities of nearly all populations and political phases characteristic of the Historic Period in New Mexico. Because of its peripheral geographic location, it was felt, however, that the study area could not be expected to reflect the total range of adaptive behavior exhibited by any given population within the region during any particular phase. For this reason, an attempt was made to develop an overview of political, economic and social processes operative during the Historic Period from a larger regional perspective. Such an overview would then provide a basis for evaluating the archeological record of those processes manifest in the study area itself.

Accordingly, a survey of the historic documentation relevant to the study area was undertaken: 1) to provide a general setting for the archeological remains in the study area; 2) to refine temporal placement of archeological manifestations into political phases as defined by the historic documentation; 3) to help generate questions of an explanatory nature to direct further archeological investigations, and 4) to compare the historical and archeological data base and assess the utility of each with reference to established research considerations.

Written documentation of Rio Grande populations indicates that changes in subsistence-related behavior were greatly accelerated during the Historic Period. Explanation of the complex nature and intricacies of these changes, especially on the local level, can only be understood through the study of various controlling nation-state systems which affected indigenous Middle Rio Grande populations. Therefore, major political events which signified changes in nation-state administration of the region were employed to segment the Historic Period into seven temporal phases:

Spanish Exploration Phase	A.D. 1540-1598
Spanish Colonization Phase	A.D. 1598-1680
Pueblo Revolt and Reconquest Phase	A.D. 1680-1692
Spanish Colonial Phase	A.D. 1692-1821
Mexican Phase	A.D. 1821-1846
United States Territorial Phase	A.D. 1846-1912
New Mexico Statehood Phase	A.D. 1912-present

The social, political, economic and settlement trends throughout the Historic Period were sufficiently complex in nature to necessitate the use of a variety of diverse materials in order to derive desired types of information. The extent and nature of the written documentation dealing specifically with the region as a whole, and the study area in particular, varied considerably through time. There is, however, a consistent paucity of data dealing directly with subsistence behavior of the rural historic populations of the Rio Grande Valley. This is due to documentary bias and the vagaries of preservation of official records. As a result, documents useful for delineating data relevant to specific subsistence behavior in the study area is sketchy or not readily available. Further archeological investigation is, therefore, necessary to help outline extant systemic processes.

Primary sources such as Church records, documents from the Court of Private Land Claims and census records were utilized to provide a descriptive record of socio-economic systems operative in the study area. Secondary materials in the form of translated and edited journals, and collated materials of an explanatory nature, were invaluable in isolating trends in adaptation and gathering general insight into particular phases.

Information contained within the court dockets pertaining to the New Mexico land grants was extremely

useful in reconstructing changes in land status within the study area, although there was much confusion surrounding the resolution of the land grant problem during the Territorial Phase and the possibility of fraudulent records.

The following overview will treat the Historic Period as seven phases which correspond to periods of political and economic articulation of the region with various nation-state systems. In order to delineate information concerning changes in subsistence-related behavior at the local level, as a result of sub-regional articulation with these larger systems, an attempt will be made to outline relationships between political, social and economic processes for the New Mexico region as a whole; and to discuss the degree to which those processes are reflected in the historical record of the study area itself. It is hoped that through this procedure the critical necessity of archeological research as an avenue of historical explanation will be made apparent.

EXPLORATION PHASE 1540-1598

Introduction

The Spanish Exploration Phase, initiated by Coronado's expedition in 1540, was characterized by a series of campaigns into the New Mexico area which were undertaken as quasi-entrepreneurial exploratory surveys. Sponsored both by private citizens and the Crown, the object of these surveys was to assess the mineral wealth of the northern frontier of the Mexican Viceroyship. Three of the campaigns apparently made contact with Cochiti Pueblo: Coronado in ca. 1540; Chamuscado-Rodriguez in 1581, and Espejo in 1582 (Lange 1959: 8-9). Despite the introduction of European domestic livestock and firearms by these early Hispanic expeditions, the pre-existing indigenous adaptive systems remained largely unaffected by Spanish contact.

Although these early quests for mineral wealth in New Mexico were unsuccessful, the explorers did return with diaries concerning the native peoples and the potential for settlement and indigenous labor. Much of this material is fragmentary and each account was biased by the exact nature of the expedition and the abilities of the chronicler. Nevertheless these diaries provide a descriptive picture of the various groups comprising the prehistoric populations of New Mexico.

When possible, translations of the original diaries and other primary sources were utilized. While these latter works were helpful, few actually dealt with our areas of interest.

Indigenous Settlement Distribution

The Spanish explorers of the American Southwest encountered several concentrations of Pueblo peoples; the most populous of which stretched for 325 kilometers along the northern Rio Grande from the southern vicinity of Belen to Taos in the north. This area included over forty separate villages in seven linguistic districts (Wendorf 1954:200). Cochiti was one of seven towns noted in the Keres linguistic district.

These villages were generally clustered along the Rio Grande and its tributaries in order to facilitate farming. Although many small seasonally occupied field houses were located at distant sites from the village and near the fields (Lange and Riley 1966:265), the people lived mostly in large compact towns with a central plaza surrounded by multi-storied, terraced dwellings (New Mexico State Planning Office 1973a:8). Neighboring mobile Apachean groups from the mountainous regions and plains, adjacent to the Rio Grande valley, often wintered at these Pueblo villages (Winship 1896:527).

Political Structure of Indigenous Populations

Spanish documentation indicates that each pueblo was politically autonomous with a sufficient internal structure to dictate policies regarding intra-pueblo and extra-pueblo affairs (New Mexico State Planning Office 1973a:15). Other sources suggest that the Pueblos sustained relationships with other Pueblo villages and Apachean groups. For example, Cochiti shared religious economic and linguistic ties with other Keres villages, in addition to maintaining alternating friendly and hostile relationships with various Apachean and Puebloan groups (Forbes 1960:239, 250). Direct historical documentation which deals with these relations or with Apachean political systems from this period is sparse.

Economics and Trade

Historical records indicate that the primary subsistence base of the Pueblo economic system during the 1500's was the agricultural production of corn, beans and squash. Although Spanish accounts are vague, they suggest that each Pueblo village was largely economically self-sufficient. However, there are indications that the Pueblo strategy for meat procurement was heavily dependent upon Apachean trade of buffalo and deer products for which the Pueblos regularly exchanged vegetable foods (Forbes 1960:119).

The archeological evidence demonstrates that manufacture and distribution of pottery also played a role in Southwestern economics (Warren 1970, 1973; Snow 1973e, New Mexico State Planning Office 1973a:6). As documented during later periods within the study area, Cochiti traded regularly with other Keres Pueblos for ceramics and blankets, and with the eastern plains Pueblos for salt (Lange 1968:152-3; Forbes 1960:94). Domesticated turkeys and dogs were also important in prehistoric subsistence strategies (Hammond and Rey 1966:172, 257; New Mexico State Planning Office 1973b:17).

Summary

From early historic records, it seems that the 16th century explorers, seeking mineral wealth for Spain and personal profit, had little direct impact upon the political and economic systems operative in the Rio Grande area. This was particularly true of Cochiti, which was off the main expedition routes (Lange 1959:8). Since the indigenous populations did not exploit precious metal mineral resources, and the explorers did not farm or actively hunt during this phase, there was little competition or disruption of pre-existing food procurement systems.

Even the horse and the cart, as new modes of transportation, and firearms, as a new method for hunting and defense, were not functionally introduced at this time, although they later had a profound impact on the indigenous populations. Except for imparting general ill-will through forceful requisitioning of winter food supplies and quarters (New Mexico State Planning Office 1973a:12), there is little historical evidence that indigenous populations were substantially altered during this

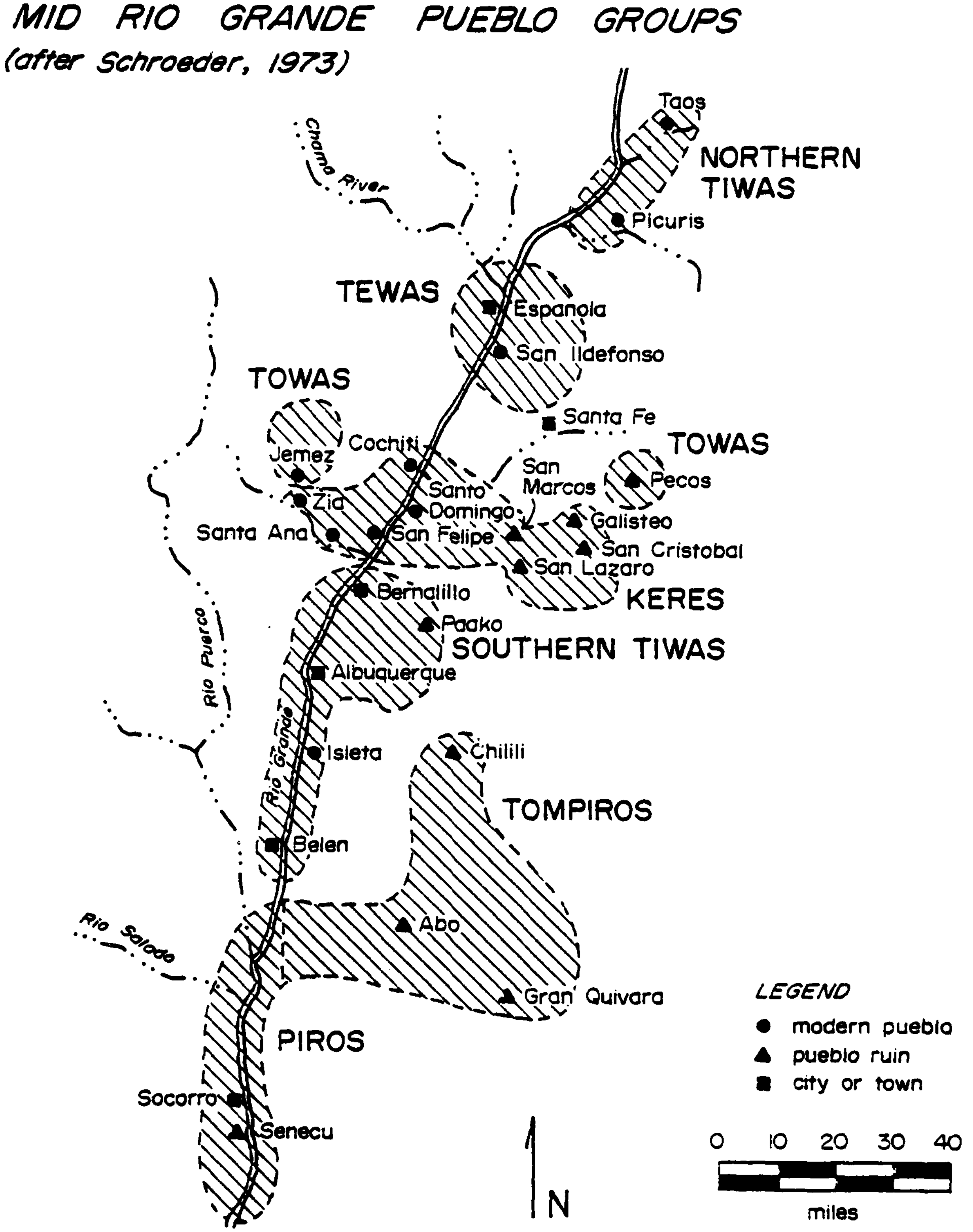


FIG. III.2.1 Mid Rio Grande Pueblo Groups

phase. It was not until the following period of colonization, when the Spanish began settling the same lands of the Rio Grande and competing for agricultural surpluses, that the Indians became affected.

COLONIZATION PHASE 1598-1680

Introduction

The period between 1598-1680 is usually referred to as the "Colonization" phase by historians despite the fact that Santa Fe comprised the only viable Spanish settlement during the 17th century. The term "Colonization" is thus employed within this report only for consistency with other historic documentation.

The Colonization Phase was characterized by the introduction of a labor exploitative system which unlike the earlier expeditions for mineral wealth, profoundly affected the indigenous populations. For example, during this time, pre-existing indigenous economic strategies were either overtaxed (in the case of the Pueblo agricultural system) or altered (in the case of trade relations) in order to reroute goods for the support of the Spanish Empire. During this phase, horses and firearms were effectively introduced as were European crops and metal tools. These changes profoundly affected indigenous strategies of transportation, defense, food procurement and production.

Internal problems between the Church and State, the two administrative arms of the newly superimposed Spanish politico-economic system, arose concerning issues of taxation and land use. These characteristics prevailed throughout the Colonization Phase, the ramifications of which culminated in the Pueblo Revolt of the 1680's.

Disappointed by the lack of mineral resources found in New Mexico, Spain would have abandoned further development of the land-locked province except for glowing reports of missionary potential by the friars (Scholes 1930a:93).

Soon after the last exploratory party, a Spanish administrative party returned in 1598 under Onate to implement a new policy involving the harnessing of indigenous labor forces. This new administration shaped the course of events in the province and the study area throughout the 17th century. To manage this new system of labor taxation, the administrative capitol of San Gabriel de Yunque was established on the Chama River near the northern end of the colony. In 1610, this capitol was relocated to the more centralized settlement of Santa Fe. This superimposition of the Spanish system upon the New Mexican Indian populations thus represented a sudden thrust of European power over 1000 kilometers north of the Mexican frontier, and articulated the province both politically and economically with Mexico and Spain. (Menig 1970:11).

Due to a faltering economy, Spain was reluctant to sponsor families as colonists and only supported ventures for wealth. As a result, New Mexico made little "progress" as a colony during this period attracting missionaries, enterprising administrators and military professionals, rather than homesteaders (Scholes 1935:96). Franciscan efforts at Europeanizing and Christianizing the Pueblo population were greatly hampered by these "enemies of all classes of labor" (Forbes 1960:115).

The historic records from this phase are largely Church and military supply records. Other documents include land transaction papers and tribute tallies, many of which were designed to mislead Spanish officials for personal profit or to cover political blunders. Most sources utilized were secondary in nature, but few dealt with the particular problems outlined. A good possibility exists that the Pueblo Revolt of 1680 may have resulted in the destruction of many records dealing with this phase.

Political Structure

With effective settlement, New Mexico became part of the Viceroyality of New Spain, and all the administrative machinery of European imperialism was introduced. A dual governmental program to manage taxation was employed which involved the State on the executive level and the Church on the local level. The secular administrative branch included a Viceroy-appointed governor who was responsible for assignments of land and water rights, military maintenance, preventing citizens from leaving the province, establishing roads and forts, and continual promotion of the missions (Scholes 1935:76). An Alcalde Mayor was delegated to each Pueblo linguistic district to assist the governor in regulating tribute. The Pueblo of Cochiti, for example, was administered through the Keres District Alcalde who was answerable directly to the governor in Santa Fe.

Meanwhile, the ecclesiastical branch attempted to Europeanize the Pueblos religiously, culturally and economically through the establishment of Franciscan missions at each village (Bolton 1962:13). As Indian agents, the Missionaries attempted to stabilize the frontier with civilized and Christianized self-supporting Indians (Bolton 1962:13). The ecclesiastical and secular branches of the government thus formed a dual paternalistic superstructure which taxed the indigenous population through the missions and the Alcaldes. This system thus harnessed the available labor force to support both provincial officials and the empire (Taylor 1975:191).

The Crown assumed full responsibility for the mission program, supplying the Franciscans with periodic caravans. The military-secular officials, however, were compensated for their services mostly through grants of encomiendas, large land tracts, in lieu of salaries. These grants also included mines, mills and salt and lime deposits (Taylor 1975:194) through which tribute and services could be extracted from residential Indians (Scholes 1935:78). The combined effect of the Mission and Encomienda systems imposed a double tax on the indigenous population and collected most of the Pueblo surplus of corn and cotton (Forbes 1960:128).

The Spanish further established themselves as middlemen in the flow of goods between Apachean and Pueblo groups. This system was not as successful in the New Mexican province as in the rest of the Empire, because of colder climates and less surplus. Further, Church and State were also frequently in conflict over the taxation issue, and often each worked to undermine the efforts of the other.

Most secular officials were, therefore, in trouble either with the Church for taxing too much, or the State for taxing too little. For example, Juan Varela de Losada, Alcalde Mayor for the Keres region in the 1660's (and probable occupant of LA 591), was forced to flee to Casas Grandes due to difficulties with various governors

(Snow 1973d:41; Chavez 1954:111). Such problems between Church and State officials, concerning Indian labor and land control, encouraged competition between these two governmental bureaucracies and led to deteriorating relations in the province during the end of the 1600's.

Settlement Pattern

The implementation of a labor-based economic strategy resulted in Spanish settlements which were situated close to existing Pueblo villages. The establishment of Spanish settlements in close proximity to the Pueblos guaranteed economic, mission and defensive support for Spanish citizens. The total Spanish population never exceeded 2500 during this phase (Scholes 1935:96).

All lands ultimately belonged to the Spanish King. Portions of the domain were granted through the governor for occupation and use to Spanish citizens, the subject taking the rent and profits (Simmons 1969:9). The principal area of settlement during this phase was the Rio Grande river valley from Santa Fe to Belen. This was the heaviest concentration of arable land and Pueblo population, and offered the greatest potential for profit.

During the 17th century, the only formally organized Spanish community in the province of New Mexico was Santa Fe. Land grants were made to a number of Spanish families; the more affluent of which founded haciendas. Thus many isolated and often fortified haciendas (such as LA 34 and LA 591), housing extended families and servants, were established adjacent to Indian lands. These haciendas were large, in contrast to later farmsteads, and required a considerable labor force in their operation (Simmons 1969:10-11).

Regarding the Pueblo settlement pattern, the Spanish aimed to consolidate many Pueblo villages in order to facilitate mission activities, administration and taxation (Hammond and Rey 1966:51). Simultaneously, the Spanish generally alienated Apachean groups from Pueblo settlements through mission policies protecting Christian Indians from non-Christian groups and trade regulations which limited inter-village travel. Such programs forced the Apacheans to withdraw from the immediate Rio Grande area and cut off their economic and social relations with the Pueblos (Forbes 1960:158).

Economics and Trade

Agriculture formed the economic base for the Pueblos and, therefore, the Spanish in the 17th century. Farming tended to be of a subsistence nature, without established one-crop exploitative plantations (New Mexico State Planning Office 1973b:17). The Spanish depended solely upon Pueblo agricultural tribute, Apache slaves and hired servants for survival (Scholes 1935:81). The introduction of the European cart and the iron plow contributed to agricultural production.

Sheep herding was introduced, and the Spanish began to trade wool both locally and with Mexico. Horses and cattle also altered transportation and pre-existing subsistence systems. In seeking to isolate Pueblo surplus for their own use, the Spanish substituted domestic meat for wild game as the primary meat source for the Pueblos. This disrupted the closely integrated Apachean and Pueblo trade as it provided Puebloan populations with an alternative meat and hide source. In response to this policy, most Apachean groups were forced to adopt a strategy of raiding Pueblo villages for agricultural produce and livestock. Through raiding the Navajos developed a sheepherding industry, and the eastern plains Apaches obtained Spanish horses for trade (Forbes 1960:191).

Spain's restrictive economic policies, stemming from domestic financial problems, forbade trade outside the colony and thus greatly curtailed trade opportunities which were open to the Pueblos before Spanish settlement. However, many inter-community and inter-regional exchange systems still operated, with or without license. The only government sanctioned source of European goods was the mission supply caravan, which arrived from Mexico every three to five years with ecclesiastical equipment, paper, tools and hardware (Scholes 1930a:95). These supplies were distributed only among the missions, for New Mexican secular officials were expected to live on Pueblo tribute. New Mexican governors and military officers soon regarded the empty returning caravan wagons as a means to transport hides, woolen and cotton goods, salt, pinyon nuts, wines and slaves illegally to northern Mexican mining communities. In return for such New Mexican products they could obtain European food items and badly needed manufactured goods (Scholes 1930a:188, 1935:82). From its founding in 1610, Santa Fe was the northern terminal and distributing point for the province of New Mexico (Bloom 1937:214). There was little circulation of money so trade operated under the barter system (Scholes 1935:109-111).

Locally, movement between the Pueblos was restricted (Forbes 1960:139) and although the Pueblos continued some trade with the Apache and Navajo and acted as agents for the Spanish in such trade, the Pueblos themselves could not let the Apache into the villages to trade. This forced the Apachean groups to step up hostilities to obtain more food, a practice which increased throughout the 1600's as horses and firearms became more available.

Thus the Spanish acted as middlemen between the Apache and Pueblo flow of goods and skimmed off the Pueblo food surplus which was formerly stored or traded to the Apacheans. The Spanish then traded this surplus to the Apacheans for a profit, thereby disrupting the food exchange system enjoyed prehistorically. Raiding, an adaptive response to this newly imposed system, further served to aggravate Spanish-Indian relations and to deplete agricultural surpluses required for Pueblo sustenance and Spanish tribute. Pre-existing trade relations were thus greatly curtailed by the rerouting of goods to Santa Fe and Mexico in the Colonization Phase.

Summary

The Spanish administrative plan in the 17th century politically and economically articulated New Mexico with Mexico, Spain and Rome by means of unwieldy bureaucratic frontier civil and mission institutions. This dual program, involving Church and State, attempted to unite the indigenous populations through Hispanic military officials under a single governmental and economic strategy to support the nonindustrial state of Spain. This strategy, which imposed a double tax on the pre-existing Pueblo agricultural economy, proved too exacting upon a system which yielded little surplus and relied upon trade for food procurement. In addition, famine and epidemics of the 1660's greatly reduced the indigenous labor force as well as increasing Apache raiding for agricultural produce (Simmons 1969:11). The prevailing scene, then, in the 17th century included overtaxation,

leading to Pueblo and Apache unrest, increasing strife between Church and State over taxation and Indian relations issues, and a serious lack of political or economic support from the Viceroy. All of these factors contributed to conditions which were ripe for revolt.

PUEBLO REVOLT AND RECONQUEST PHASE 1680-1696

Introduction

Political and ecclesiastical competition, little financial aid or guidance from Mexico, combined with problems concerning the enforcement of laws regarding humane treatment of indigenous populations, had created much discord among the provincial administrators during the preceding phase. Suppression of Pueblo religion, interference with pre-existing trade and food procurement systems, aggravated by famine and disease, further served to alienate the Puebloan and Apachean groups from the Spanish bureaucracy. Simultaneously, logistical support from Mexico and Spain was minimal. Security was weakened as many New Mexican Hispanos had already abandoned the province, relocating to the Casas Grandes area to avoid oppression (Hackett 1942b:19, 69).

Those accounts which were utilized to summarize the character of this phase, were primarily letters and secondary works based upon diaries of the fleeing Hispanos and accounts of the De Vargas reconquest of the colony. This information suggests that the period of revolt was characterized by a short-lived political unity among the Pueblo and Apachean groups, and an ensuing return to pre-contact systems. The revolt was not confined to New Mexico, but spread as well to northern Mexican groups as a response to in-migrating Hispano fugitives from New Mexico (Forbes 1960:201). Except for French penetration into Texas during this phase, which posed a threat to northern Mexican mines, it is possible that the province of New Mexico might have remained independent indefinitely (Forbes 1960:211).

Taking advantage of the Spanish situation, the Pueblos and Apaches united in 1680 to remove the remaining Hispanos and all vestiges of their influence. This well-planned revolt was a political, religious and economic phenomenon aimed at restoring pre-contact ways of life. As the Spanish were driven south, most Pueblos abandoned their villages close to the river and regrouped in more defensible, less accessible locations. Others joined the Hopi and Navajos to the west. The Cochiti took an active part in the revolt, withdrawing to the nearby mesa of Potrero Viejo with allies from Santo Domingo, San Felipe, Taos, Picuris and San Marcos to construct the large village of Kotyiti, LA 295 (Flynn and Judge 1973:6).

Meanwhile, the surviving Spanish fled southward to the El Paso and Casas Grandes regions where they encountered many ex-citizens from New Mexico who had also sought asylum. Overnight, 2,000 new refugees from the north, including Spanish officials, Mexicans, sympathetic Pueblos and Apache slaves and servants descended on the area, taking the lands of the Mansos, Sumas, and Janos (Forbes 1960:183). These new refugees were forbidden to scatter and were concentrated in El Paso under the governor to facilitate future plans for reconquest (Hackett 1942a:cviii).

Political Influences

Politically, the Indians of New Mexico were suddenly cut off from Mexico and former trans-world connections. However, through the implementation of the above defensive strategy against Spanish retaliation, they did not return completely to the autonomous governmental systems described in early historical accounts. Some European political influence remained as Indian governors attempted to keep the Rio Grande united during the next twelve years from the centralized Palace of the Governors in Santa Fe. Individual rivalries soon surfaced, however, which led to internal dissention and weakened political cohesiveness (New Mexico State Planning Office 1973a:15).

Meanwhile in El Paso, the New Mexicans, as part of the province of Nueva Vizcaya, waited for permission from the Viceroy to return north (Hackett 1942a:cviii). Several campaigns for reconquest were initiated, but proved unsuccessful. Little is known historically about either the indigenous New Mexican or fugitive adaptive systems which were operative during this time.

Economics and Trade

Formal trade networks and communications with Mexico, which had been to the Indian disadvantage, were severed during the revolt. There remained much interaction between Pueblos and Apaches. Apaches traded as well to the south for horses stolen from the Spanish (Forbes 1960:190-191). It is doubtful that many of the aboriginal contacts maintained prior to Spanish entry were reestablished, although New Mexico was now free to trade to the north, east and west. Barter for salt, buffalo products, corn, woven goods and pottery continued between Pueblos and non-Puebloan groups.

During the years of independence (1680-1692), there was a general return to subsistence farming and herding. Although most trappings of the mission and secular administrative institutions were eradicated (Forbes 1960:189), the effect of Spanish settlement remained clearly evident in the retention of European crops, horses, sheep and cattle.

Independence was short lived. By 1692, the Spanish were organizing a systematic reconquest of New Mexico under Diego De Vargas (New Mexico State Planning Office 1973a:15). The Spanish force was strengthened by reenlistment of settlers from the Casas Grandes area; each recruit was issued axes, hoes and a plow (Hackett 1942b:94).

De Vargas soon controlled the Palace and in 1693, returned to El Paso with the intention of enlisting more settlers and Franciscan missionaries. The new settlers met armed resistance in Santa Fe and, though the Palace was recaptured, Pueblo resistance was not broken for three more years. De Vargas burned the village of Kotyiti in 1693, forcing the Cochiti and their allies back to their former villages along the Rio Grande.

However, in 1696, the Pueblos again revolted and many Cochiti fled to Old Kotyiti. With the arrival of Spanish troops, the refugees dispersed to Navajo settlements and to the Keresan village of Acoma. From there, they founded the village of Laguna as a permanent settlement in 1697 (Forbes 1960:265, 267).

Thus, during the twelve year independence from Spanish control, Pueblo populations, particularly those villages located within the middle Rio Grande valley,

underwent significant changes in distribution. Many groups relocated to areas controlled by the Western Pueblo or Navajo peoples which were well-removed from effective Spanish control. Settlements, established during this period and subsequently in the early 18th century by refugees from the reconquest, were characterized by isolated locations. Although in easily defended areas, they were less conducive to agricultural pursuits than the Rio Grande Valley. Those Spanish colonists who returned to New Mexico from El Paso found it impossible to control the isolated Western Pueblos and hostile Apachean groups. The security of the Rio Grande Valley was constantly threatened by these Apaches and the sphere of Spanish influence was effectively confined to a narrow band of valley bottom from Socorro to Taos.

Summary

During the twelve year interval of Pueblo independence, political, social and economic ties with Mexico were severed completely. Indigenous populations most likely attempted to reestablish relationships which existed prior to Spanish domination. That strong ties still existed between Pueblos and Apachean peoples is demonstrated in the strong blend of cultures characteristic of the refugee period, due to interactions between Pueblos of the middle Rio Grande and Navajo groups to the northwest.

Historical documentation of the twelve years following the Pueblo Revolt in New Mexico is nonexistent. Similarly, for the period following the reconquest, there is very little written documentation concerned with ethnographic description outside the immediate sphere of Spanish influence. Knwoledge of this period is generally confined to archeological investigations of refugee sites.

COLONIAL PHASE
1696-1821

Introduction

With the reestablishment of Spanish control, New Mexico resumed its colonial frontier articulation with Mexico and Spain. A new land use system for New Mexico, which de-emphasized the encomienda and mission land utilization systems operative prior to the revolt, was introduced. This new land tenure system encouraged settlement by Hispanic colonists, particularly in the central Rio Grande region. Another trend was the progressive weakening of the Spanish Empire and the subsequent loss of power in the New World.

The nature of the historical information for this period is quite detailed and specific with regard to certain aspects of colonial adaptive systems. The archives, both Surveyor General and Court of Private Land Claims material yielded many descriptive passages concerning the land grant litigation in the study area, although exact locations and references regarding grants are often difficult to interpret. In addition, many primary and secondary works deal with the financial problems of the Spanish Crown and resulting colonial autonomy. Little information exists concerning the political and economic organization of New Mexico's rural indigenous populations or Hispanic homesteaders during this period.

Land Settlement

During the 1700's, the Spanish provincial administration attempted a different exploitative strategy from that which was employed before the revolt. While a similar dual civil and religious administrative structure was reestablished, the Crown promoted Hispano and Hispano-Indian settlements on a large scale in New Mexico through the implementation of a land grant system aimed at increasing the Spanish population. For example, through the grants of settlement tracts, many Tlaxcalan families were encouraged to emigrate from Mexico in the early 18th century to serve as troops and agents with the Apachean groups (Gibson 1967:189). The land grants assigned both exclusive and common rights of agricultural and pastoral land usage to individuals and family groups in contrast to the former labor and tithe rights of the encomienda system. The Pueblos were officially granted their lands at this time.

Many of the Hispanic communities served as fortified outposts for the more heavily populated Spanish areas (New Mexico State Planning Office 1973a:16). The resulting settlement pattern during this time period was characterized by large numbers of extended families clustering along the Rio Grande and its tributaries. These settlers attempted to farm and herd their own land parcels rather than depend upon Pueblo labor and food procurement for support. However, many of the Hispanic land grants encroached upon Pueblo Indian land grants despite governmental protection of the latter. Illegal, untitled settlers also infringed upon Hispanic land grants until they were ousted (Simmons 1969:13).

The new government was eager to establish new towns, and settlements were initiated during the 18th century in regions which had not previously known Hispanic occupation (Simmons 1969:12). Thus the labor exploitation policy of the preceding century was exchanged, after the revolt, for one of land exploitation as the primary economic adaptive system. This strategy of populating the frontier was largely designed to buffer the northern Mexican mines from French and Apachean incursions.

White Rock Canyon served as a common boundary to five land grants established in the early 1700's. These included the La Majada grant, awarded to Jacinto Sanchez in 1702 (Twitchell 1914a:230, 318); the Caja del Rio grant, awarded to Nicolas Ortiz in 1742 (Twitchell 1914a:318); the Ramon Vigil grant, awarded to Captain Pedro Sanchez in 1742 (Surveyor General Reel 16, Report 38); the Canada de Cochiti grant, awarded to Antonio Lucero and a number of Mexican families in 1732 (Twitchell 1914a:469); and the Rito de los Frijoles grant, awarded prior to 1742 to Andres Montoya (Surveyor General Reel 25, Report 113).

The La Majada, Caja del Rio and Ramon Vigil grants encroached upon the surrounding Pueblo land grants of Cochiti, Santo Domingo and San Ildefonso, and were characterized by nonresidential land owners who rented the land to sheepherders (Court of Private Land Claims, Reel 37, Report 39). This economic strategy of renting land and employing sheepherders, which was fostered by Mexican wool markets and the increasing Hispanic labor force, dictated land usage in many Spanish settled areas.

In contrast to these neighboring grants, the Canada de Cochiti settlement consisted of a loose agglomeration of small farmsteads, or ranchos, lining the Rio Chiquito for several leagues. This kind of settlement was characteristic of many frontier communities during the Colonial Phase and constituted a marked departure from the large and wealthy haciendas which were characteristic of the

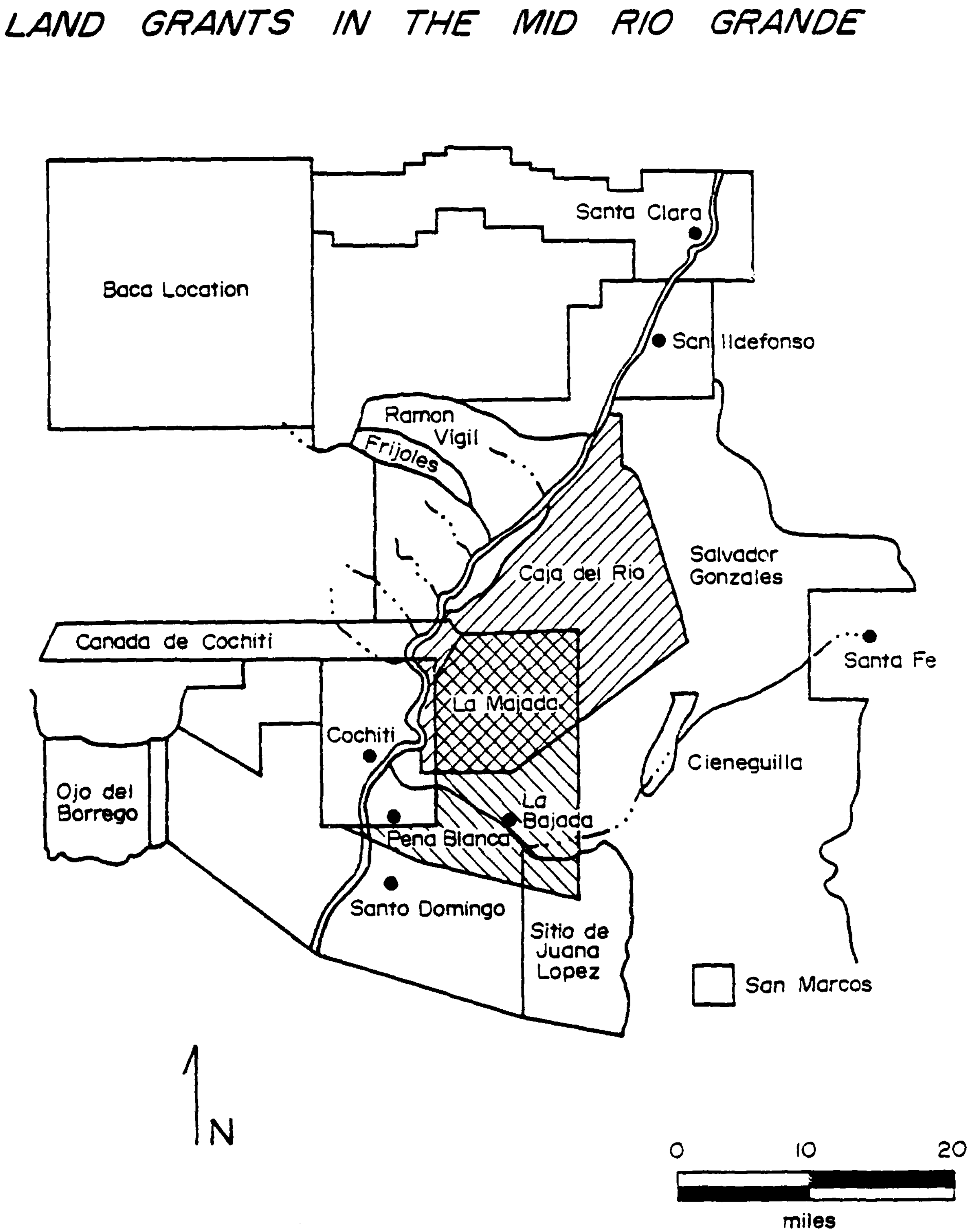


FIG. III.2.2 Land Grants in the Mid Rio Grande

17th century. The shift from large land holdings, or encomiendas, to modest farms may be attributed to the numerical decrease of Indian population and labor supply with the increasing number of Hispanic colonists demanding farmland in the Rio Grande valley (Simmons 1969:11). Administered through the Cochiti mission and the Keres Alcalde, the Canada settlers maintained relations with the Cochiti for trade since the Rio Chiquito often failed to supply enough water to irrigate the crops (Dominguez 1956:159). Cooperation among the residents of Cochiti and the Canada settlers for defense against Navajo raids occurred later during the Colonial Phase as well (Lange 1959:15). Herding was also an important means of subsistence as evidenced by the Canada settlers' dispute with Spanish troops over the grazing rights of Medio Canyon (Flynn and Judge 1973:8).

Administrative Systems

Eighteenth century administrative trends which affected the study area included both military and mission policies. Forts or presidios were established early in such rural areas as Cochiti (Lange 1959:10). Often they were utilized to facilitate offensive campaigns of Spanish and Christian Indian troops to Apachean inhabited areas to kill or capture slaves for sale or personal use. As a result, Pueblo-Hispano-Apachean relations were profoundly affected; the Apacheans responded by raiding Hispano and Pueblo settlements for agricultural produce, slaves and livestock.

Franciscan missions were reestablished at each Pueblo and the resident friars again helped to organize labor for the production of foodstuffs and cottage manufacturing for Colonial trade and tribute (Bolton 1962:13). The Franciscans never achieved the degree of logistical support or numbers they enjoyed before the revolt. By 1788, there were only 30 friars in New Mexico (Simmons 1968:107). This was due partly to the secularization of the priesthood in 1798 (Chavez 1974:208) which freed New Mexico of an organized mission program. In addition, the missionaries, acting in their capacity as Indian agents largely ignored the neighboring Hispanic settlers (Chavez 1974:208). As a result, the Brotherhood of Light (or Los Penitentes) became established during the late 1700's (Weigle 1971:115) in such rural communities as Canada de Cochiti, Cochiti Pueblo and Pena Blanca. This secular organization sustained local, religious, judicial and economic functions in a time of continued need throughout the remote Hispanic settlements of New Mexico (Weigle 1971:114).

Thus the settlement pattern of the 18th century was one of alternating clusters of Pueblo and Spanish land grants lining the Rio Grande and its tributary drainages. Missions were located at each Pueblo which served both Indians and neighboring Hispanos; military posts were established for defense. Various Apachean bands surrounded the area, in response to pressures from the Comanche in the east (Forbes 1960:192). Throughout the 18th century, epidemics, drought and continued Apachean raiding caused periodic abandonment of many ranchos and pueblos (Dominguez 1956:251).

Economics

The long-range provincial economic strategy was to support a financially faltering, nonindustrialized Spain. Because New Mexico seemed to lack readily accessible mineral resources, the Spanish were forced to adapt their economic strategy to exploit other natural resources, which included land and labor, for the support of Spain. The Empire's absolute dependence upon colonial tribute resulted in policies which restricted foreign trade from New Mexico and which channeled all goods south to Mexico. During this phase, the citizens paid only a single federal tax in the form of corn and woolens. These products, together with Apache slaves, were traded regularly in northern Mexican mining towns for metal tools and European goods.

Another important aspect of New Mexican commerce was the annual trade fairs held in Taos and Chihuahua. These fairs served to circulate colonial and European goods on a more local basis (New Mexico State Planning Office 1973b:14). The Comanche traded buffalo products, horses, mules and slaves as well as many French products, such as guns, ammunition, tobacco, hatchets and tin vessels, which could not be obtained from Spain (Dominguez 1956:252). Pottery, weavings, corn, Spanish bridles, cloaks, knives and salt were circulated in exchange (Dominguez 1956:252).

The Hispanic economic systems of farming and herding were aimed both at sustenance and trade, although much of the surplus was taxed through the federal tribute system or owed to neighboring wealthy landlords. Even though a double tax system was no longer in effect, many Hispanic farmers were in debt.

In attempting to monitor all circulated goods, the Spanish essentially managed again to cut off most Pueblo-Apachean trade involving the exchange of faunal food resources for cultivated foodstuffs. Because the Spanish implemented different policies regarding administration of Pueblo and Apache populations, this system served to sever the Apache from Pueblo food sources except through Spanish trade. This policy, combined with the non-Christian slave trade business, continued to force the Apacheans into raiding as a means of resource procurement. Apachean raids thus accelerated throughout the 18th century and resulted in extreme stress upon the economic base of the Hispano Pueblo economic system.

By 1776, Apache and Navajo raiding became so severe that to defend her domain Mexico placed the northern provinces under separate military command (Worchester 1975:28). In the 1780's, the Spanish attempted another strategy for dealing with the Apaches. Peace treaties were encouraged and, despite Spain's economic problems, a semiregular government subsidy of food, supplies and guns was provided to Apachean groups. This resulted in a period of relative peace between 1790 and 1830 during which ranching and some mining operations spread along the northern frontier (Worchester 1975:28-29). This policy of government support was to prove important in the following phases when subsidies were discontinued and raiding, again, became a severe deterrent to Hispano population expansion and trade.

Summary

The Colonial Phase, as seen in the context of the study area, is characterized by the following trends: the continual influx of land-granted Mexican families competing for irrigable lands with the Pueblos; the growing importance of wool as an item of exchange both locally and in Mexican markets; the Spanish policy of disrupting indigenous food procurement strategies in order to profit from the distribution of goods; a resulting increase in Apache raiding; and a growing trend towards local frontier auto-

nomy with regard to political, economic and religious organization. As Spain's internal economy faltered, the northern provinces were drawn together through lack of support from Mexico. Political and economic influence from abroad dwindled as financial stresses in the European countries decreased aid. Local awareness of political revolutions in the United States and France helped to foster ideas of independence from Spain and freedom from crippling trade regulations.

MEXICAN PHASE 1821-1846

Introduction

The beginning of the Mexican Phase is defined by Mexico's political independence from the Spanish Empire in 1821. The phase came to an end in 1846 when the New Mexico area was annexed as a territory by the government of the United States.

Many political, economic and social trends which characterized the latter decades of the Colonial Phase were accelerated during the Mexican Phase as the New Mexico area became increasingly autonomous in its government, religious organization and control over trade relations. Influence of Mexican governmental control over the affairs of New Mexico lessened throughout the Mexican Phase, as did the authority of the central Catholic Church administration over local religious organization. Restrictions upon trade relations between New Mexico, the United States and Comanchero traders were lifted, with the result that the economic structure of the region underwent considerable change.

The historical documentation of the Mexican Phase is poor, in part due to the deterioration of a centralized bureaucracy which had previously generated many records of government operations. The general literacy of the New Mexican population declined as well because of emigration of many Spanish citizens who had previously held government posts, and the general collapse of Church influence. As a result, most primary documentation of the phase was written by incoming Anglo traders who had little familiarity with the language or cultural behavior of the indigenous Indian or Hispanic populations.

Political Structure

Unlike the Spanish rulers, the Mexicans did not utilize a strictly exploitative strategy, either through taxation or homesteading, in their dealings with New Mexico, due largely to chronic internal disorganization and distance. The only communications Mexico maintained with New Mexico were by channels of commerce and the mails delivered to Santa Fe and Tome twice monthly (Bloom 1913-1914:15). Almost completely ignored by Mexico, New Mexico was able to establish some popular self-government and protection of civil liberties at this time (Valdes 1971:14). Indians were granted full citizenship and plans were initiated for a public school system (Jenkins and Schroeder 1974:37, 40).

However, Mexican rule scarcely altered the legal status or civil administration of New Mexico: even the current Spanish governor at the time of independence was allowed to finish his term. Later, the banishment of all Spanish citizens from the province (Weigle 1971:115) forced the popular elections of certain local representatives and appointment of native New Mexicans to the office of governor. This was a marked departure from the former Spanish policy of absolute control, and resulted in a powerful group of families coming to dominate New Mexican politics (Jenkins and Schroeder 1974:34).

The loss of influence by the Catholic Church, through the lack of both Mexican and Spanish funding, fostered rapid growth of the Los Penitentes as a local political and social force in replacement. This quasi-religious group became widespread in the isolated mountain Hispano communities, providing many social services long neglected by the Church. As a result, the Los Penitentes soon became a powerful political and economic factor in local political campaigns, representing the rural people as the Church had done formerly, and a force to be reckoned with in the larger elections (Valdes 1971:7-8). Canada and Pena Blanca were both Penitente centers (Lange 1959:24). The Pueblos returned to an autonomous political structure similar to that operative prior to conquest.

The Cochiti area remained under the Keres Alcalde jurisdiction as before, until 1828, when the Mexican government divided all of Mexico into departments, thereby dissolving the former states and territories. In the Department of New Mexico, the jurisdiction of eight alcaldes was merged into two, and later three prefecturas, with Cochiti and the middle Rio Grande administered through Santa Fe. However, by 1837 this plan proved unpopular, largely because Mexico attempted to exercise control through the appointment of a Mexican governor and the levying of taxes. Local discontent culminated as revolutionaries from Chimayo killed several cabinet members at Arroyo Hondo and Santo Domingo, which forced the Mexican governor to flee (Jenkins and Schroeder 1974:42).

During most of the Mexican Phase New Mexico was dominated politically by Governor Manuel Armijo, who pocketed most of New Mexico's revenues and alienated poor peasants and in-migrating American traders, both judicially and economically. As Josiah Gregg, Santa Fe Trail trader complained:

> the hapless litigant who has not the means to soften the claws of the alcalde with a "silver unction" is almost sure to get severely scratched in the contest, no matter what may be the justice of his cause, or the uprightness of his character (Moorehead 1974: 159).

This type of policy, along with New Mexican duty charges on American trade items, was soon considered an economic hinderance and helped to encourage American political intervention in the following years.

Settlement

In 1822, the total population of New Mexico approximated 40,000 persons in 26 Indian villages and 102 Hispano plazas (Bloom 1913/1914:29, 31). The newly evacuated Spanish citizens left behind Hispano, Pueblo, and Genizaro communities in much the same settlement pattern as before, although the increased Apache raiding forced some intermittent constriction of settlers into larger centers. According to postal records, Canada de Cochiti was considered a village, Cochiti and San Ildefonso as pueblos and alcalde seats, Bajada as a hacienda, Pena Blanca as a plaza, and Sile as a ranchito (Bloom 1913/1914:14).

By 1835, Navajo attacks had become so severe, due

largely to Mexico's failure to continue the aid program begun by the Spanish, that both settlements in the Canada Grant, El Rancho Viejo de Don Lucero and the village of Canada, were temporarily abandoned as the residents moved to Cochiti and Pena Blanca for protection (Flynn and Judge 1973:8). Other grants were also abandoned during this time, including the Caja del Rio grant, in 1818 (Court of Private Land Claims Reel 37, Report 39) as the Navajo and Ute continued to raid farming and herding districts to appropriate produce and prisoners. As Mexico lacked both the funds and power to administer an aid program, the nomadic tribes were again forced to step up raiding as pressures from the east and north from in-migrating Anglos further confined hunting grounds. Mexican rewards for Indian scalps and slaves only aggravated the situation, and it was not until well after the Americans assumed power that the Apachean groups were controlled.

During this phase, more land was granted than during the Spanish Colonial Phase, with more grants made to communities rather than individuals (White *et al* 1971: 30). In addition, Governor Armijo illegally granted land to Americans (Jenkins and Schroeder 1974:44). By 1844, near the close of the Mexican period, New Mexico was still divided into three districts, with those settlers in the central area, including the Cochiti region, numbering 12,500 and administered through Santa Fe (Prince 1883:239).

Economics and Trade

In 1803, prior to Mexican independence and acquisition of New Mexico in 1821, the United States purchased the Louisiana Territory from France. New Mexico was now no longer buffered by this vast, unexplored eastern country nor protected by Spanish troops from direct contact with the expansion-minded United States, a position which was to shape the economy and soon the politics of the Southwest. Americans had long been interested in the mines of northern Mexico and a transcontinental access (Ulibarri 1963:265), and the foreign territory of New Mexico was blocking progress. To feed her own weakening economy, Spain had forced New Mexico to trade only with the internal provinces. While American goods were both expensive and illegal, many Mexican items, such as cloth, cost even more (Moorehead 1974:13).

Under the new administration of 1821, New Mexico was opened up for trade, and a booming, successful trade was established along the Santa Fe Trail from Missouri to Mexico. Using mule trains and ox-carts, goods were transported valued yearly as high as $450,000 (Bloom 1937:215). Initially the Mexicans saw this move as strategy to bolster the domestic economy. Mexican traders soon began losing profits to the competitively cheaper American goods on the New Mexican market and the Mexican government became concerned about the volume of gold flowing from Mexico to the United States (Moorehead 1974:297). This led to friction between Mexico and the United States and eventually to war.

But New Mexico welcomed the trade as it created jobs for drivers, packers, hotel and tavern owners, merchants and bankers; encouraged production with new marketing possibilities, and bolstered New Mexico's treasury through customs collections. New Mexicans were eager for American manufactured calico, buttons, metal hardware, canned goods and bottled beer (Walker 1966:134). In return Mexican gold bullion or specie, mules, horses, woolen products and flour were shipped east (Walker 1966:55).

Americans soon began to exercise much economic influence in New Mexico, both internally and externally. Many Anglo immigrants settled in Santa Fe and Taos as merchants and bankers connected with Santa Fe Trail trade. Anglo fur trappers, buffalo hunters and health seekers also began to enter New Mexico in increasing frequencies. Scalp hunting and slave trading were also lucrative for Anglos, because the Mexican government paid a high bounty for Apachean scalps rather than funding major military campaigns against the raiding tribes. This varied economic articulation through the Santa Fe Trail with the industrialized U. S. nation state soon led to strong political ties and helped ease American annexation in 1846.

Possibly more important than the Santa Fe Trail trade in local economics was the Comanchero trade, an outgrowth of the Taos trade fairs of the 1780's (Kenner 1969:52). The resulting trade proved essential for rural Hispanos and Pueblos, as the plains Comanche maintained trade relations with eastern tribes having access to American manufactured items, such as firearms, farming tools, and cloth, at a time when these goods were not available from other sources.

Initially the trade between the Comanches and the Pueblos and Hispanos consisted of the exchange of agricultural products, such as bread, flour, cornmeal, sugar, onions, dried pumpkins, tobacco and various dry goods (Kenner 1969:84-85) for plains products including buffalo hides and tallow. The Comanche also dealt in horses, trading them to eastern tribes for American guns, blankets, powder, lead and cloth, which were in turn traded in New Mexico (Kenner 1969:85). In addition, the Pueblos maintained trade relationships with such tribes as the Sioux, Cheyenne, Araphao, Crow, Ute, and Shoshone (Kenner 1969:88). These trade relationships with peoples to the north and east of the Rio Grande Valley were possibly more important to rural New Mexicans than the Santa Fe Trail, because American goods were expensive. The few manufactured items which reached such rural regions as White Rock Canyon during this phase probably did so through trade relations with Plains Indians.

Locally, trading was still common among settlers and Indian groups, at trade fairs and between neighboring communities, particularly for food, wool and Indian pottery. Despite new contact with American economic systems, New Mexico still had no cash economy.

Opening up the region to foreign business gave mining a new impetus, both from new modes of transportation and by monied Americans who could finance mining operations. The discovery of gold in the Ortiz Mountains in 1828 kept the Santa Fe government solvent for several years (Jenkins and Schroeder 1974:41). Such discoveries encouraged American speculation, land appropriation and settlement.

Despite the relative intensity and variety of trade activity during the Mexican Phase, the local New Mexico economy remained dependent upon herding and agriculture. Sheepherding was engaged in primarily by Hispanos. Herds were owned by rich, landholding patrons who generally lived in the large settlements, while the actual work of herding was undertaken by poorer rural

residents who interacted economically and socially with the owners as clients in a well-developed patron-client system. New markets for wool and mutton developed during the 19th century as mining activity increased in both northern Mexico and California, and New Mexico's vast pasturage of grama grasses was ideal for sheep production (Moorehead 1974:114). Many rural Hispanic farmers thus supplemented their incomes through herding for their patrons (Valdes 1971:1-2). Don Thomas Cabeza de Baca of Pena Blanca was one of the rich patrons who during the Mexican Phase owned many sheep (Valdes 1971:3), and undoubtedly many settlers within the study area were engaged in his services.

As before, the Pueblos still provided much of the agricultural produce for the larger towns and a large quota of military troops to protect farmlands from Navajo raids (Jenkins and Schroeder 1974:37). While Hispanos maintained family garden plots, they were largely concerned with herding, while the Pueblos raised produce for exchange. Until the 19th century, the Pueblos were the only New Mexicans cultivating grapes (Moorehead 1974:187). That the Pueblos were able to benefit directly from the Santa Fe Trail trade is unlikely, and any trade for metal implements was probably carried on through the Comancheros (Kenner 1969:85). The Pueblos were also in possession of large cattle and horse herds (Moorehead 1974:187) kept largely for their own use and local trade.

Summary

During the end of the Spanish Colonial Phase and into the Mexican Phase, ecclesiastical and political support dwindled until there were so few priests and officials that neither the Pueblos nor Hispanos could be effectively administered (Carrol and Haggard 1942:29). The Pueblos now openly practiced their native religion, retaining only the trappings of Catholicism, and allowed missions to fall into ruins (Dozier 1970:89). Likewise, the Hispano communities developed the institution of Los Penitentes in response to local religious, social and political needs.

As during preceding phases, the Pueblos were able to maintain control over much of the arable land in the Rio Grande valley throughout the Mexican rule due to federal guarantees of land rights. The Hispano population was thereby still confined to the surrounding lands generally less suitable for agricultural pursuits, although excellent for herding. Pressures from hostile Indian tribes had restricted much new settlement expansion since the early 18th century. As a result, the Santa Fe Trail traders of the 1820's found a society unique in form and more stable than that of Mexico on the one hand, but scarcely changed in local economics or settlement pattern since the Pueblo Revolt (Carrol and Haggard 1942:27, 36).

Throughout the twenty-five years of Mexican rule, a number of trends which had started during Spanish rule continued, while several new trends began which were to persist throughout the United States Territorial Phase to the present. Possibly the most far-reaching of the older trends was New Mexico's isolation and lack of industrial development, while the most important of the new trends was the increasing interaction with the United States, an industrial, expansionistic nation state immediately bordering the New Mexico region after the Louisiana Purchase.

UNITED STATES TERRITORIAL PHASE 1846-1912

Introduction

Since the Louisiana Purchase of 1803, the United States had been interested in acquiring New Mexico, a region close to the rich mines of Northern Mexico. Acquisition of the territory by the United States was necessary to complete the western push to the Pacific. The opportunity to assume control came in the 1840's when loss of Mexican political and economic support left New Mexico especially vulnerable to outside influence. In addition, the landlocked region was connected with Mexico only through long, hazardous, seldom traveled overland routes, forcing New Mexicans into economic dependence upon the United States. As a result, pastoral, feudalistic New Mexico suddenly became annexed to the progressive industrialized United States. A clash in social, economic and religious values disrupted indigenous New Mexican society throughout the Territorial Phase, and continues to shape New Mexican society today.

By the close of the Mexican Phase the population of New Mexico numbered 61,547 non-Indians (Seventh Census of the United States 1853:134) and approximately 7,000 Pueblo Indians (Dozier 1970:104). These populations were largely confined to the central Rio Grande valley. For over two and one-half centuries continuous pressure from hostile nomadic Indian groups surrounding the valley had successfully cut New Mexico off from effective control of the interior Mexican provinces, thereby hindering the expansion and development of the region by Spanish and Mexican interests. Although social and economic trends in New Mexico were patterned after a Mexican mode, the severe lack of administrative and logistical support from the interior and the increasing competition for an already restricted resource base had not allowed the full expression of the Mexican system. With the gradual decline in support from Mexico, two distinct cultures had developed in the Rio Grande valley. New Mexico had become

> . . . an arrested frontier society stalemated physically, culturally and economically by the conditions of the land and by the Indian menace (Lamar 1966:31).

Politics

In the early 19th century, with the establishment of the Santa Fe trade, the borders of the rapidly expanding western frontier of the United States and the far northern frontier of the Republic of Mexico had met in Santa Fe, which became the focus of economic and political interaction between the United States and Mexico. By the spring of 1846, the desire on the part of the United States to control the sources of precious metals and protect established economic interests in Northern Mexico, coupled with Mexican resentment over United States' interference in Texas, resulted in war between the two nations. New Mexico, long isolated from support from Mexico and having established political and economic ties with the United States, was placed in an unfavorable position to resist the military advance of an aggressive industrial power. Thus, in August of 1846, United States forces under the command of Brigadier-General Stephen W. Kearny, met little resistance as they marched into New Mexico. On August 19, from the plaza in Santa Fe, Kearny officially claimed New Mexico as a territory of the United States.

With the signing of the Treaty of Guadalupe Hidalgo in 1848, and the conclusion of the Mexican American War, Mexico relinquished to the Unites States claim to almost half of her land mass; the territory now included in the present states of Texas, New Mexico, Arizona, California, Nevada, Utah and Colorado. In addition, in 1853, the United States purchased from Mexico a large tract of land extending the international boundary southward in what is now the states of New Mexico and Arizona. Thus, in the brief period from 1846 to 1853 the United States had completed its western push to the Pacific and the present continental boundaries were established.

Following five years of strict military rule, the United States Congress passed the Organic Act, which recognized and defined the Territory of New Mexico and established the formal political structure which prevailed for the duration of the Territorial Phase. United States territorial policy, although not formalized, was essentially one of progressive self-government and stabilization of the local economy through massive government subsidies (Lamar 1966:13). As a territory New Mexico was not represented in Washington, but rather was governed by a succession of governors appointed by the president. Appointments were made largely on the basis of the spoils system, with the result that few governors were overly concerned with New Mexico's problems, and corruption became a characteristic of New Mexican politics throughout the 19th century (Lamar 1966:14). In addition, the national political importance of the region was exaggerated because New Mexico was granted territorial status during the height of the sectional controversy. Governed by presidential appointees caring little for local needs, New Mexico became a political pawn increasingly sensitive to trends developing on a national level (Valdez 1970:27). Thus, when the sectional conflict resulted in outbreak of civil war, New Mexicans were drawn into the conflict. After the creation of the Confederate territory of Arizona in 1861, two major battles were fought on New Mexican soil. For three days in March of 1862, the Confederate flag flew over Santa Fe.

The Civil War marked the end of the sectional conflict and a major change in national interest in New Mexico. Attention was turned towards military action against hostile Indian groups surrounding the Rio Grande Valley, and Anglo settlers soon began to arrive in larger numbers. With the creation of the Territory of Arizona in 1863, New Mexico's geographical and political framework was established, and statehood was imminent.

New Mexico had become a territory of the United States during a crucial and strife-torn period during that country's history. By the late 1860's the conflicts of interest resulting in the Mexican-American War and the Civil War were largely resolved. Although the early stage of the Territorial Phase was characterized by gross redefinition of geographical and political spheres of influence on a national and international level, the impact of these decisions was not immediately felt by the peoples of affected regions. New Mexico was as isolated from the influence of the eastern seaboard as it had been from Mexico City. With the end of the sectional conflict, the reduction of hostile tribes and the arrival of the railroad into the region in the 1880's, New Mexico became increasingly dependent on the economy of the United States.

New Mexico presented a unique territorial situation because it was occupied by peoples whose rights were guaranteed under the conditions of the Treaty of Guadalupe Hildago, and who had long been accustomed to self-rule. Although the articulation of the region with the United States implied the beginnings of popular self-government and the separation of church and state, the isolation of the region and the diverse populations involved presented almost insurmountable problems in assimilating the region into a national culture. New Mexico

> had become, with the advent of the Anglos in larger numbers, a land of vast cultural, religious, racial, political, and economic differences among its people. Factions, feuds, bitterness, and a chronic inability to unite effectively resulted from these differences (Larson 1968:62).

The following discussion will outline the impact of United States political systems and policies upon the peoples of the Rio Grande Valley.

1. The Hispanos

Due in part to the unfavorable social and economic conditions of the frontier, two classes of Hispanos had developed in New Mexico (Carlson 1969:30). All wealth and political power were controlled by a landed aristocracy comprised of only a few families (Lamar 1966:27). The patron-client system which evolved during the Spanish Colonial and Mexican Phases, had become an effective means of survival oriented toward subsistence and self-sufficiency (Lamar 1966:27). Although this patron-client system was essentially a reciprocal relationship of mutual dependency and trust (Holmes 1967:22), it had nonetheless resulted in the concentration of wealth and political power in a very few New Mexican families. The patron system was particularly powerful in the middle Rio Grande Valley where the leading Hispano families maintained control over large tracts of land granted while New Mexico was under Spanish rule.

Articulation of the United States political system over the existing structure was facilitated by utilizing the patron system as an established means of control over the majority of New Mexico's population. The retention of politically powerful patron figures in key positions of the local government has to some extent perpetuated this system into the present.

The patron, however, did not exercise absolute control over the communities under his jurisdiction. In the absence of church supervision during the Mexican Phase, community groups of Lay Brothers had assumed representation of the Church and the rural population of New Mexico. During the Territorial Phase, this united front of Penitentes became a powerful political force.

Although considered emancipated citizens of the United States, New Mexican Hispanos were at a disadvantage. A high percentage of rural New Mexicans were illiterate and thus were effectively disenfranchised. Patron figures, rather than representing the population under their jurisdiction, often exploited them. In addition, rural populations were little prepared to defend their lands and were soon alienated from these lands by speculators, many of whom were politicians.

2. The Pueblos

With the gradual decline of ecclesiastical control from Mexico, the Pueblo population had largely reestablished their traditional organizational and religious structure

(Dozier 1970:94). Through the Mexican Phase the Pueblos had retained control over desirable arable land in the Rio Grande Valley because the Mexican government recognized title to the lands granted to them during Spanish rule. In the absence of Mexican jurisdiction over their religious and internal affairs, however, the Pueblos had been able to reestablish their traditional socio-political organization, thereby maintaining their villages as politically autonomous communities.

The Pueblos under Mexican jurisdiction were considered emancipated citizens of Mexico. Although the United States agreed through the Treaty of Guadulupe Hildago to respect the rights of all citizens of Mexico, the Pueblos were considered as enclaved dependent nations and therefore, were administered according to United States Indian Policy (Spicer 1962:353). As wards of the Federal Government, the Pueblos were provided with a superintendent whose responsibilities included the protection of Pueblo land rights (Spicer 1962:349). Thus, the Pueblos were largely insulated from the political and economic change of the Territorial Phase. Federal policy toward the Pueblos, however, was concerned with slowly breaking up tribal land holdings, establishing formal schools, improving the economy, and replacing the native religion (Spicer 1962:352). Federal aid to the Pueblos consisted of agricultural implements and technical assistance. The Anglo program, however, had no provision for the development of Pueblo political participation. As a result, no liason institutions were created between tribal governments and national political organization (Spicer 1962:348).

Economics

1. Agriculture and Herding

During the Territorial Phase, New Mexico's economy was still largely based on agrarian subsistence strategies, particularly along the Rio Grande Valley. Prior to Anglo contact, New Mexico's remote situation and crippling trade barriers implemented by Spain had resulted in an extreme scarcity of manufactured hardware, and a marked shortage of cash on the northern frontier, thereby precluding the establishment of banks and sedentary merchants (Parish 1959:321). Mexico itself was an industrially impoverished nation, and was unable to develop or support her northern frontier. The most isolated regions of the frontier, including New Mexico, had developed little or no industry, and consequently agricultural technology and subsistence strategies had persisted largely unchanged into the 19th century.

Josiah Gregg, in his travels to New Mexico during the Mexican Phase, noted the marked scarcity of hardware and the abundance of trinkets (Moorehead 1974:257). Gregg was also of the opinion that New Mexico was so poor that the Comanche felt it unprofitable to raid there (Moorehead 1974:437). Gregg went on to add in his description of New Mexico in the 1830's:

> There is no place on the civilized globe perhaps, where the arts have been so much neglected and the sciences so successfully impeded as in New Mexico (Moorehead 1974:140).

As a result, New Mexico's land-based economy, which had been stable for so long, was greatly altered during the course of the Territorial Phase. The Pueblos, who were able to keep much of their land resources, continued farming as before, while the Hispanos lost much of their pastoral resource base and were displaced, a trend which continues today. This upset in economy was accelerated as hostile nomadic tribes were controlled; Anglo settlers arrived, and the railroad connected Santa Fe to the eastern industrial centers. This rapid change, resulting from the clash of Pueblo-Hispano and American ideologies characterized the Territorial and Statehood Phases. Under the conditions of the Treaty of Guadulupe Hildago (Ellis 1975:10-31) the rights of New Mexicans were to be respected by the U. S. government. Treatment as enclaved nations, however, temporarily insulated the Pueblos from economic disruption introduced by Anglo land speculation and development. With progressive diminishing of control from Spain and the Mexican interior, the Pueblos had reestablished their communities as productive, autonomous villages controlling most of the desirable arable land in the Rio Grande Valley. As self-sufficient agricultural communities, the Pueblos were little affected by the peonage herding system practiced by the Hispanos, and were able to maintain their own trade relations with other groups.

The unfavorable balance of trade, lack of industry, and hostile conditions on the frontier had resulted in two classes of Hispanic New Mexicans, Ricos or Patrones, and Peones (Carlson 1969:30-31; Lamar 1966:27-28). The Patron system, essentially a landed aristocracy controlling large numbers of clients through debt peonage, had evolved into a powerful political and economic force during the Mexican Phase which resulted in a few families controlling the wealth in New Mexico (Lamar 1966:28). Herds of over 2,000,000 sheep owned by a single individual during the Mexican Phase were not uncommon, and thousands of partidarios were employed to herd them (Grubbs 1960:171). Prior to the change in sovereignty, contracts for these sheep had been maintained with Chihuahua and Durango to feed miners (Carlson 1969: 26). However a limited market and dwindling resource base had not allowed the full expression of this system (Charles 1940:62) until the United States military began to reduce the Navajo and Apache threat, and new markets for New Mexican sheep were created in the mining communities of California, Colorado and elsewhere in the west.

By 1850 New Mexico supported the largest number of sheep in the west (Carlson 1969:25), and by 1880 had the highest concentration of 71 per square mile where the study area is located (Carlson 1969:33). Even the primary unit of exchange was sheep (Carlson 1969: 27). With the banning of peonage in 1867 (see Ellis 1975:55) the power and wealth of the patron was gradually eroded by merchants and private businessmen who, through debt financing, began to acquire large herds of sheep which they then rented on share contracts to herders (Carlson 1969:36).

This modified version of the Patron system commonly called the *Partido* system, persisted until 1905, when events following the Civil War resulted in its decline. These events included a change in market needs from meat to wool, increasing control of the range by homesteading, a rise in wage labor, and severe depletion of the range through overgrazing (Charles 1940:33; Carlson 1969:37).

2. Trade Relationships

New Mexicans, in the absence of reliable commercial relationships with Mexico and with insufficient technology to develop the abundant resources of the region, had strengthened trade relationships with the nomadic

tribes to the north and east. These trade relationships were similar in nature to the system witnessed by the early Spanish explorers in the 16th century (Kenner 1969:86). Initially, this commerce, known as the "Comanchero" trade, was an important means by which the Pueblo-Hispano population of the Rio Grande valley could acquire the plains products necessary for subsistence, such as buffalo hides, meat and tallow, as well as manufactured items from the east coast in exchange for agricultural products and horses. Developments influenced by the Civil War, however, dramatically altered the character of this long standing trade and finally destroyed it.

The basic underlying cause of the change in the character of the trade by the 1860's was the establishment of United States Army forts on the frontier. By the 1850's these forts had become a steady source of mass produced goods and a market for agricultural produce from the Rio Grande valley and buffalo products from the plains, thereby disrupting the flow of goods between the Comanche and New Mexicans (Kenner 1969:91). This trade system was further altered by the increasing demand for cattle to support numerous military campaigns and to feed the confined Indian tribes. As buffalo numbers steadily decreased, the importance of the Anglo cattle industry increased proportionately.

During the Civil War the Union encouraged Comanche raids on the expanding cattle ranches in Confederate Texas through trading firearms, ammunition, whiskey, and sugar for the stolen cattle (Kenner 1969:156. 163). In addition, Anglo entrepreneurs, many of whom were prominant New Mexican merchants, found the Comanchero trade a convenient and profitable means to fill contracts to the United States Army by supplying the Comanchero traders with cheap goods to trade for the contraband (Kenner 1969:173). Likewise, many ranches were initiated in New Mexico with stolen Texan cattle. By the 1870's military campaigns against the Comanche had successfully brought the Comanchero trade to an end.

Settlement Pattern

The change in sovereignty from a remote department of Mexico to an equally remote territory of the United States had little effect on population distribution in New Mexico until after the Civil War. At this time, the study area remained situated in the heart of the Pueblo-Hispano stronghold bordering the central Rio Grande valley. Population distribution here had remained relatively stable since the reconquest with Pueblos maintaining control over much of the desirable agricultural land while Hispanos seasonally utilized the vast expanses of pasturage above the valley. The communities in this area had the deepest historical roots and were thus the most prepared to resist the Anglo advance. However, events following the Civil War, including the passing of the Homestead Act in 1862, the reduction and confinement of the hostile nomadic populations by the 1870's, and the arrival of the railroad in 1880, were to have a direct impact on the social geography of territorial New Mexico.

With the Treaty of Guadalupe Hidalgo, the United States had agreed to respect property rights established under Spanish and Mexican control. Accordingly, congress created the Office of Surveyor General in 1854 to survey and clarify title for New Mexico's land grants. Few grants, however, were verified prior to the establishment of the Court of Private Land Claims in the 1890's due largely to Anglo-American misinterpretation of the Spanish-Mexican land tenure system. Surveys of the grants soon revealed a high incidence of overlap in grant boundaries, which in many cases resulted in unresolvable confusion.

Regarded as wards of the government, the Pueblos were least affected by the influx of Anglos. Pueblo land rights were recognized early and protected by appointed agents acting in the Indians behalf (Spicer 1962:348-349). Cochiti land claims, for instance, were verified in 1858 (Cohen 1942:386). As a result of Federal regulation and supervision, the Pueblo societies remained a stable element in a rapidly changing regional system. Pueblo numbers, lowest in the 1850's, (Dozier 1970:104) remained relatively constant throughout the Territorial Phase, while the population of the region as a whole climbed steadily; more than doubling by the turn of the century (Dozier 1970:91).

While Pueblo populations were protected from demographic distortion, neighboring Hispano communities were greatly affected by large scale land speculation. Hispanos in the Rio Grande Valley, while equally unprepared to defend their land rights, were considered emancipated and therefore not subject to close government supervision. Thus, many Hispanos fell victim to aggressive and, more often than not, illegal activities by Anglo land speculators and many were alienated from their lands. In addition, an unfavorable precedent had been set by the courts by not recognizing community ownership of vast tracts of common lands (Jenkins and Schroeder 1974:61). With their primary resource base removed, many Hispano communities were unable to survive. La Canada, for instance was finally abandoned around 1900 (Flynn and Judge 1973:9). Members of these dissolving communities were quickly absorbed into the rapidly growing wage labor pool, working in the mines, on the railroad, or traveling further afield as agricultural or industrial workers in the greater west.

With the removal of the Indian threat, vast areas outside of the Rio Grande valley were opened to settlement, both by Hispanos moving out of the valley and by Anglos entering the region from the east and west. By the close of the Territorial Phase, alienation of vast tracts of land had forced the economic displacement of many Hispanos from the Rio Grande Valley. Many of the common lands necessary for herding had fallen into private hands and were eventually acquired by the Federal government for purposes of range control. By the close of the Territorial Phase and into the early Statehood Phase, much of the land bordering White Rock Canyon had come under such Federal jurisdiction which controlled its use by neighboring communities including Cochiti, San Ildefonso, Pena Blanca and La Bajada.

The influx of Anglos in larger numbers and exploitation of new resources made possible by mechanized transportation and technological advancement soon resulted in the superimposition of characteristically Anglo settlement pattern over an existing structure (Meinig 1971:58). Anglo settlements, geared to the exploitation of specific resources were born, and died, as prices fluctuated on a particular commodity in the east. By 1900 nearly a million acres had been affected by small farming operations established under the Homestead Act (Carlson 1969:37). Homestead farming resulted in fencing the range, and control of water sources vital to the Partido system of sheep husbandry.

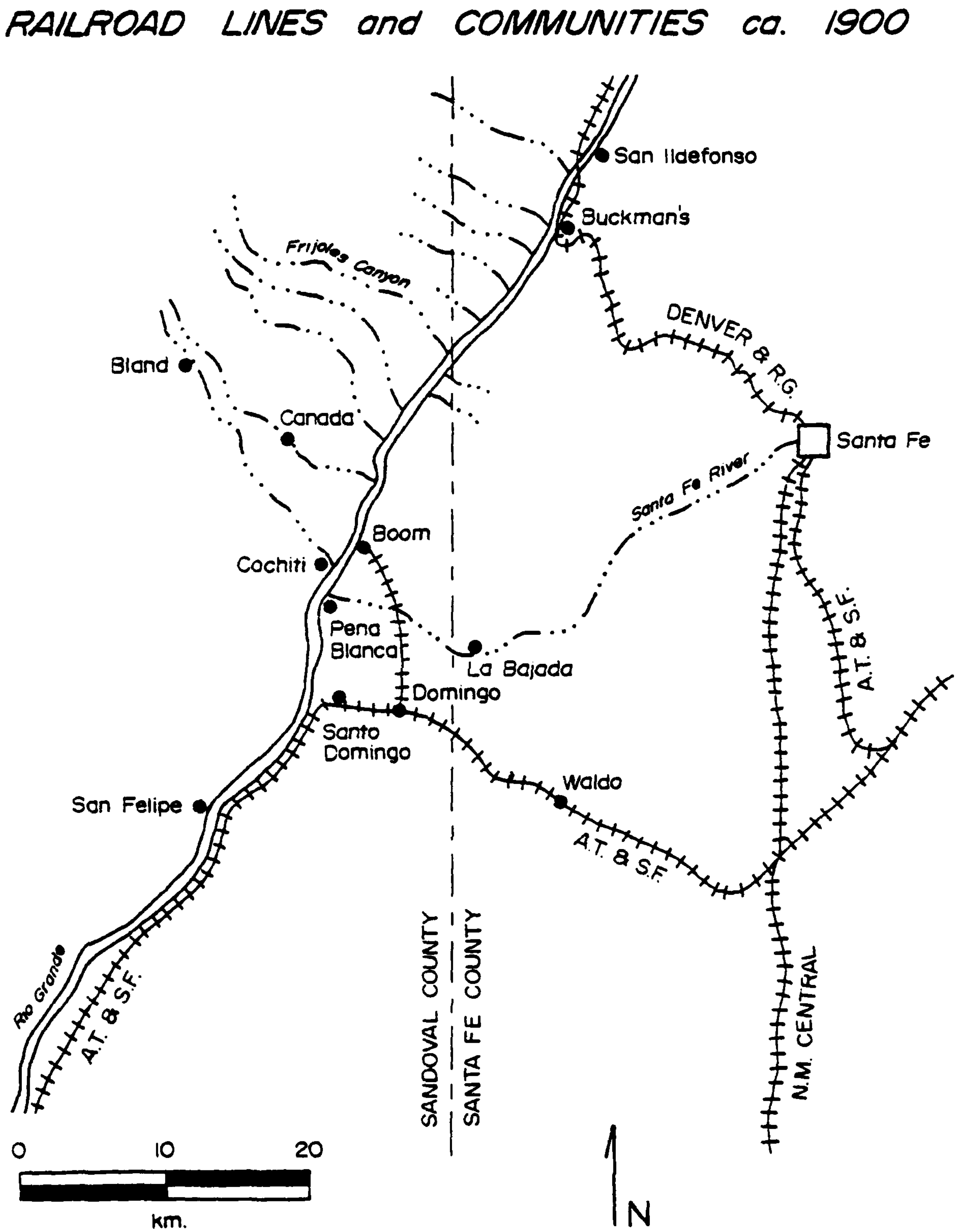


FIG. III.2.3 Railroad Lines and Communities ca. 1900

The arrival of the railroad in the 1880's was possibly the single most important event conditioning the change of social geography in the Southwest. Although wage labor had already become an important aspect of New Mexico's economy, the railroad accelerated the articulation of the region with the economy of the United States. With the railroad came mobility, economical exploitation of bulk resources, and jobs to support the growth and maintenance of the new system. By the close of the Territorial Phase, settlement pattern within the region consisted of the established Pueblo and Hispano communities along the Rio Grande and its tributaries and Anglo communities were located with respect to exploitable resources, rail heads and commercial centers.

Summary of Settlement Pattern

The settlement pattern established and maintained throughout the Spanish and Mexican phases was not dramatically altered during the course of the Anglo Territorial Phase. Although Hispanos suffered from alienation of their resource base, many communities were maintained through family members entering the wage labor pool. Pueblo communities were largely insulated from Anglo land use policies and speculation through recognition and protection of their land rights by the Federal government. The major changes in settlement pattern within the region were the reduction and confinement of hostile nomadic tribes surrounding the Rio Grande valley, the introduction of a cash economy and radical advancement in technology, and mechanized transportation which resulted in the alteration of subsistence base and corresponding demographic structure. Dependent upon resources necessary to an industrial economy, the characteristic Anglo settlement pattern differed radically from that established during Spanish and Mexican rule. Thus, Anglo communities were largely established in the vicinity of exploitable resources or at centers made commercially important by location of the railroad.

Summary

The articulation of New Mexico's economy with that of the industrialized United States ultimately resulted in profound changes in subsistence systems within the region. Prior to the military reduction of the nomadic tribes surrounding the Rio Grande valley and the introduction of mechanized transportation in the 1880's, New Mexico's isolated and removed situation had hindered the economic exploitation of the resources necessary to sustain the greater United States. Thus, the era of United States control prior to the Civil War was characterized by the persistence of economic trends established during the Mexican Phase along with the gradual introduction, by means of massive government subsidies, of a cash-wage economy necessary to assimilate New Mexico into the larger economic system.

The immediate impact on New Mexican economics with the change in sovereignty was the severance of trade relationships with Mexico. This was offset, however, by the creation of new markets for New Mexican products, particularly sheep to feed the California and Colorado miners. With the creation of steady new markets, the expansion of the land resource base due to the reduction of the Navajo and Apache, and the demand for local products to supply forts established in the region, the partido system flourished (Charles 1940:25). The need to feed the military and confined Indian populations during the 1860's and 70's combined with the tremendous amount of land area opened by the confinement of hostile tribes gave rise to the Anglo cattle industry. Competition for resources and the control of the range by homesteads, compounded by the alienation of lands due to speculation, contributed to the decline of the partido system by 1905 (Carlson 1969:37).

Of great importance in the change in New Mexico's economic picture is the introduction of a money-based exchange system, and the corresponding rise in mercantile capitalism and wage labor. Although cash continued to be a scarse commodity on the frontier until the arrival of the railroad in the 1880's (Fierman 1964:10), it had appeared in New Mexico during the 1840's in the form of substantial Army payrolls and lucrative supply contracts. As the forts were in constant demand of local produce, sedentary merchants were able to establish in local communities, filling contracts in part through barter of manufactured goods for local produce (Parish 1959: 321). During this period manufactured goods, particularly agricultural implements, were distributed among the Pueblos (Cohen 1942:385). Scarcity of goods at this time, particularly manufactured hard goods is demonstrated in the rise of local tin work and the rapid recycling of discarded Army rubbish (Boyd 1974:295). Although sedentary merchants were established during this period, manufactured items as a rule were not readily available, and many items were available only through direct trade with personnel at the forts (Kenner 1969: 91-92). This trend was in direct competition with the Comanche. In addition to disrupting regional trade systems, cash soon changed the resource base of many individuals from land to labor, and unlanded groups moved to follow employment.

This situation was reinforced by the mid 1880's by two transcontinental railroad lines entering New Mexico along the old routes of commerce, the Santa Fe Trail and the southern route to California (Meinig 1971:41). The advent of mechanized transportation and associated technological advancement had a profound effect on a region historically far removed from centers of commerce and industry. Most importantly the railroad facilitated large scale exploitation of bulk resources, including lumber and mineral ores. As a result, these industries mushroomed overnight and soon became a primary resource base, along with cattle, for the Anglo economy.

With the railroads also came increasing numbers of new settlers and resource speculators, in addition to new tools, equipment and ideas. The railroad created new jobs and new towns, such as Domingo (Wallace), Boom, Buckmans, Bland, Albermarle, Waldo and Hagen, all located in or in close proximity to the study area. Thus Anglo mobility and cash economy rudely pulled New Mexico from a stable pastoral existence into a chaotic and unstable industrial system. This sudden disruption of stable economic systems was to continue during statehood, affecting settlement, politics, and social mechanisms to the present day.

NEW MEXICO STATEHOOD PHASE
1912-present

Introduction

In 1912, statehood was granted to the Territory of New Mexico. The implications of the change in status, although superficially political, were profound. With statehood came representation and participation in the United States national system. Many of the trends estab-

lished during the Territorial Phase persisted into the Statehood Phase. New Mexico and the study area in particular became a land of contrast as scientific communities were established adjacent to long occupied Spanish and Indian villages. Throughout the Statehood Phase, trends in politics, economics and settlement distribution of rural New Mexicans became progressively more consistent with the United States national modes.

Political Structure

New Mexico's transition from territorial to statehood status was primarily political in nature and had a differential effect upon the diverse population sharing the confines of the Rio Grande Valley. With the granting of statehood the gradual process of self-rule was completed and the region was accepted as a functioning unit in the national framework. With representation in the national political system, New Mexico, as an extremely large and diverse region, was no longer totally at the mercy of outside interests in a country "strongly prejudiced against the Spanish speaking, Roman Catholic people of New Mexico" (Larson 1968:303). As in the Territorial Phase, Santa Fe remained the focus of political articulation between the region and the nation and the basic political framework was set. The gradual process of progressive self-rule and representative government was manifest in at least four major shifts in county jurisdiction since 1852 (Jenkins and Schroeder 1974:74-75). As population increased within the region, counties became progressively smaller, and thus more representative. The study area was affected in turn by each of the county changes during the Territorial Phase and today lies within Sandoval, Santa Fe, and Los Alamos counties. In addition, the creation of the Los Alamos Scientific Laboratories in 1943 and subsequently the creation of Los Alamos County represented a significant Anglo intrusion (*as a community) within the study area.*

During the Statehood Phase the population of New Mexico increased dramatically with a steady influx of Anglos into the region. As of 1960, only 25% of New Mexico's population of 951,023 had Spanish surnames (Dozier 1970:106). On the local level, political interaction between the communities within the study area, the state and ultimately the nation differed considerably among the Pueblo, Hispano and Anglo populations. For the Hispanos, political trends established during the Territorial Phase persisted into the 20th century. Hispanos maintained political control of northern New Mexico and remained dependent in part upon politics as a means of sustenance (Meinig 1970:102). As the resource base of the Hispano communities diminished, both through Anglo land speculation and deterioration of the range, many members of rural communities were forced to relocate in the growing urban areas of the region, particularly Albuquerque, which had replaced Santa Fe as a commercial center. This movement out of rural Hispano communities gradually eroded the power of the Penitentes who had formerly presented a powerful and united political force representing the rural Hispano.

The Pueblo population within the Rio Grande valley numbered approximately 21,525 persons as of 1967 (Dozier 1970:107). The change in status from territory to state affected the Pueblo communities quite differently from their Hispano neighbors. As enclaved corporate municipalities, the Pueblos were subject to protective, but restrictive jurisdiction from the Federal government. With statehood, United States policy toward the Pueblos became more consistent with Federal attitude towards all confined Indian nations. The Pueblos, who throughout the Territorial Phase had been administered to a degree by local agents, became more of a Federal responsibility and were, therefore, administered directly through Washington. (Cohen 1942:389). With the passage of the Indian Reorganization Act in 1934, Federal policy towards the Pueblos no longer emphasized the replacement of native religion and instead was directed toward conservation through public works programs, stabilization of the local economy, development of natural resources, and elaboration of existing education and health services (Spicer 1962:353). In 1935 with the establishment of the United Pueblo Agency, an attempt was made to create a more efficient liason institution between Pueblo community organization and the Federal Government on an administrative level (Lange 1959:25). In effect one purpose of the Agency was to vest recognized power in the Governor and council of each Pueblo in order that they could act with the same "legality as any other municipality" (Lange 1959:26).

Economics

The economic structure of the Southwest region as a whole and the study area in particular is characterized by a gradual adoption of a cash economy by the local populations. The nature and character of this transition is determined to a great degree by rapid technological advance in transportation and communication systems throughout the twentieth century, as well as the particular character of the interface of the different cultures with the greater United States. Although natural resource exploitation continues to be a major economic consideration for the region as a whole, this avenue of economic pursuit has declined in importance for the populations of the study area. For example, the railroad connecting Domingo Station with Boom was abandoned and dismantled in 1928 (Myrick 1970:174), signaling the end of lumbering as a steady source of income for the area residents.

Economic trends following the Second World War, although consistent with developments in the Territorial Phase, were manifest in behavior much more specialized and diverse in character. This behavior was largely the result of massive government spending which replaced private funds predominately directed at resource exploitation. Uncontrolled exploitation of resources in the latter Territorial Phase had resulted in serious destruction of resources, particularly the range and watershed areas, and ultimately necessitated Government intervention and public works programs to restore a semblance of equilibrium to the deteriorating grazing lands. Beginning in the 1920's and continuing to the present, tourist traffic became significant in shaping the economic pattern of the study area (Lange 1959:171). Tourists, sojourners and settlers, were attracted to the region because of its cultural variety and historic interest and atmosphere (Meinig 1971:103). The Pueblos especially profited by this steady influx of people interested in Pueblo culture and willing to purchase Pueblo products. Thus Anglo patronage of Pueblo craftsmen became a significant aspect of the Pueblo-United States economic articulation (Dozier 1970:110).

Although sharing the same geographic area, the Hispano communities were not treated as well under the law as the Pueblo peoples. With the depletion of the range and almost total loss of their traditional land-based economy, many Hispanos were forced into dependence upon politics as a means of subsistence. Welfare became

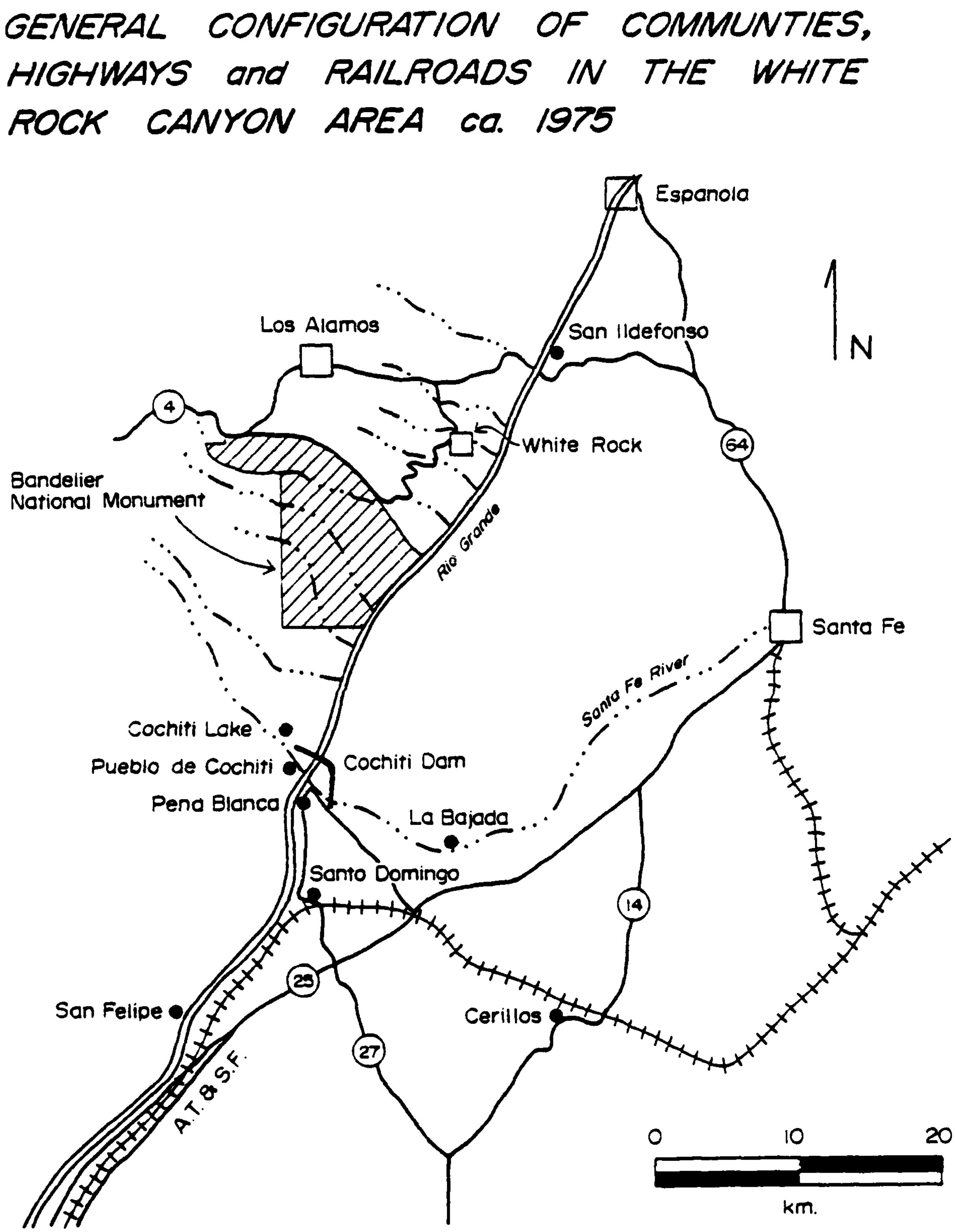


FIG. III.2.4 General Configuration of Communities, Highways and Railroads in the White Rock Canyon Area ca. 1975

an important aspect of the Hispano economy in many areas (Meinig 1971:102). Anglo patronage of Hispanic craftsmen was not significant and the Hispanos became more critically bound to the national economy through family members working far afield for wages (Meinig 1971:103).

Following the Second World War, new trends in economic adjustment to the cash economy were greatly accelerated by government spending in the area. The study area, because of its isolated situation in respect to large population centers, was selected as the location for the Los Alamos Scientific Laboratories in 1943. This community served as an important and steady source of employment for local populations such as San Ildefonso. At the other end of the study area, public works programs had begun in the late 1920's with the allocation of Federal funds for reclamation work on Cochiti lands in 1927 (Cohen 1942:392). Emphasis was on conservation, irrigation, drainage and flood control within the Middle Rio Grande Conservancy District. During this period of conservation and restoration of natural resources, much of the private lands surrounding the Rio Grande Valley came under Federal jurisdiction. Construction of the original Cochiti Dam, the Cochiti Frijoles Trail and development of Bandelier National Monument, took place during this period, and provided employment for area residents.

The economic picture was also affected by the rapid increase in population during the latter Territorial Phase and the Statehood Phase. The increasing dependence of New Mexico's populations upon a cash economy is illustrated in a marked drop in irrigated acreage within the Rio Grande Valley, proportionate to an overall population increase. By 1942 only 30% of the valley population was dependent upon subsistence agriculture (Harper *et al* 1943:52, 58).

The economic patterns established toward the end of the Territorial Phase persisted well into the present century and were not greatly modified until the Second World War. At this time cumulative technological advance in transportation and communication systems along with the participation of local populations in the armed forces served to accelerate the assimilation of New Mexico's peoples into the national system. The development of the automobile as an efficient and rapid means of transportation had a great deal of influence in this regard. By the mid-1930's, the automobile had successfully replaced the railroad in importance, and with the construction of an efficient network of highway facilities, many rail lines were abandoned. The abandonment of the Denver and Rio Grande Chili line, which entered the northern end of the study area, occurred in the 1940's.

The automobile resulted in a pronounced change in the relationship between the study area, the Southwest and the United States as a whole. With the construction of the interstate highway system, the Southwest was no longer as remote and isolated from the centers of political and economic influence. An elaborate system of paved roads was constructed between the study area, Santa Fe and Albuquerque which facilitated commuter traffic to those centers of employment. Wage labor thus began to replace agriculture and herding as a source of employment for all populations within the study area. This trend was continued with the construction of the Cochiti Dam, and the ancillary projects created as a result of that construction. An outgrowth of government-sponsored construction projects has been an increasing recreational usage of land areas within the study area.

During the 20th century the economic articulation between the study area and the United States changed dramatically as technological advances and population increases drew the region closer to the national economy. Large scale Federal spending had a direct impact on populations within the study area. As more and more acreage came under United States jurisdiction, Federal reclamation and development projects employed local residents. The ultimate expression of this trend, Cochiti Dam, was designed primarily for flood control. Recreational use of the lake, however, is anticipated to result in direct and indirect economic benefits for local residents. Finally, the establishment of the community of Cochiti Lake within the study area, characterizes a recent trend within the Southwest of recreational development and establishment of retirement communities. Like Los Alamos and White Rock, residents of Cochiti Lake Estates are not dependent economically on local resources.

Settlement Pattern

With statehood, much of the established settlement pattern in the Middle Rio Grande Valley was maintained, although with Anglo settlement superimposed over the existing structure. In other parts of the state and the Southwest at this time, settlement had been profoundly affected, as cattlemen and farmers moved into the Southwest, displacing and confining nomadic populations to remnants of their former lands. Other incoming Anglo groups settled primarily in the commercial centers, such as Albuquerque. In the study area, Pueblo population distribution remained stable during early statehood due to federally guaranteed land grants and the general unsuitability of the land for anything but subsistence farming and herding. Hispano settlement distribution, however, was affected by the Sandoval Decision of 1913, in which 12,000 persons, mostly Hispanos were removed from Pueblo lands (Cohen 1942:389). The short-lived Anglo communities of Bland and Boom disappeared by the 1920's, along with the Canada de Cochiti settlement whose residents moved to Pena Blanca. Only Buckman's remained as a small railroad stopover between Santa Fe and Espanola, and this community was also abandoned by 1941.

World War II brought many changes which profoundly affected Southwestern economics and settlement. The establishment of Los Alamos and subsequently White Rock in the northern end of the study area represents a wholly new kind of community for New Mexico. Largely composed of Anglo scientists and administrators, the settlement was not dependent upon local resources. Los Alamos had little initial impact on the local community as secrecy and exclusiveness were enforced. More recently, the community has proved a nearby source of employment for wage laborers from San Ildefonso and other rural communities.

The widespread availability after the war of automobiles and the corresponding building boom and improvement of interstate transportation systems served to facilitate many of the economic and settlement adaptations of the formerly isolated Southwest. Rapid transport systems greatly increased the articulation between areas within New Mexico and the greater United States. Locally, the automobile encouraged much movement out of the rural centers and into the cities, which provided economic opportunities. The automobile also facilitated commuting from local communities to such employment centers as Albuquerque, Santa Fe, Los Alamos and

Espanola. The study area settlements of Cochiti, San Ildefonso and Pena Blanca, while still basically farming communities, are largely dependent upon wage incomes from surrounding cities. In addition, the automobile has encouraged new forms of land use, including recreation.

The establishment of Bandelier National Monument in 1916 (Hewett 1953:viii) and the construction of the Cochiti-Frijoles Trail late in the 1920's, foreshadowed the increasing use of the area for recreational purposes. After World War II, many recreational services were built at distances from main metropolitan centers where rivers could be dammed or slopes developed for skiing. Cochiti Lake should become a major recreational facility. It has encouraged Anglo settlement in the area, primarily in Cochiti Lake, which represents the latest trend in land speculation, aimed at the establishment of preplanned retirement communities.

Since World War II, the Southwestern population has doubled, an obvious indication of the new era of development and ability to create modern living environments in otherwise inhospitable areas (Meinig 1971:82). Because the automobile frees the developed community from dependence on land resources, new planned settlements, such as Cochiti Lake Estates, are being built all over the Southwest. Because of high costs for land and housing, however, local residents cannot generally afford to settle in these corporately owned towns.

In addition to recreational and development programs, the presence of agencies of the United States government within the study area has become more pronounced. Large tracts of land have been obtained by the Federal government, largely for conservation purposes. The Caja del Rio Grant is administered by the Forest Service, and portions of the Frijoles and Ramon Vigil grants are incorporated into Bandelier National Monument. The Atomic Energy Commission maintains control of Los Alamos County which borders on Bandelier National Monument and San Ildefonso lands. The ownership of vast amounts of acreage within the study area by institutions and Federal agencies has resulted in further limiting and regulating use of the land by local populations.

Summary

Although the transition from territorial to statehood status was primarily political in nature, the implications for change in all aspects of New Mexican life were profound. During the 20th century rapid developments in technology had a tremendous effect in assimilating rural New Mexican populations into the national culture. In addition, World War II marked an important turning point within the statehood phase. At this time, many trends established during the territorial period reached maturity. Although local populations have continued to maintain their separate identities, they have become increasingly dependent upon and affected by the greater United States.

III.3
Survey of Cochiti Reservoir: Methodology

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INTRODUCTION

Intensive archeological survey of 9060 acres (3668ha) within Cochiti Reservoir was undertaken as two stages of a multi-phase program of assessment and mitigation of cultural resources to be inundated by the reservoir. The first stage was conducted between February 5 and March 5, 1975, and resulted in location and documentation of all cultural resources within the 1240 acre (502ha) permanent pool which follows the 5322 ft (1623m) contour interval upstream of Cochiti Dam. The permanent pool survey was undertaken by a four person crew and necessitated 16.5 working days for its completion. An additional two days were allotted for crew training prior to implementation of the survey.

The second stage of survey was directed toward location and documentation of all cultural resources within the flood control pool. The additional 7845 acres (3166ha) encompassed during this stage were situated between the 5322-5460.5 ft (1623m-1664m) contour intervals upstream of the dam. Impoundment schedules and personnel availability dictated that this second stage of survey begin after the field phase of mitigation for sites within the permanent pool was completed. Survey of the flood control pool was initiated on May 5, and completed by July 24, 1975, after a total expenditure of 42.5 working days in the field. A six person crew was employed during the first 20 working days, while a four person crew was employed during the remainder of the survey. Four days were allotted for training of survey personnel for this phase.

The following sections will outline the rationale, field methodology and data recording techniques employed during both survey stages. Although survey procedure was largely similar during both stages, some specific changes in data recording technique were implemented during the second stage to refine character and quality of information recorded. These changes will be discussed where appropriate.

GOALS

Intensive archeological survey of land areas within the permanent and flood control pool levels of Cochiti Reservoir was undertaken with the intent of locating and documenting information about all surficial archeological remains present within the project boundaries. Documentation was directed toward description of those remains to permit evaluation of their significance and to facilitate planning for a program of mitigative action. Theoretical considerations underlying specific survey procedures employed will be discussed briefly.

Archeological remains constitute material by-products of human behavior. Such material by-products do not exhibit innate qualities of significance through existence upon the landscape, but rather become significant when used as data to inform about the behavior which resulted in their deposition.

Given the long temporal span and great diversity of cultural behavior apparent in the near vicinity of Cochiti Reservoir suggested from previous anthropological and archeological research, intensive survey was directed toward documenting archeological remains in a way which would allow them to be used as information about the operation of previous cultural adaptive systems within the project area. These information needs dictated that three general realms of variability be documented for all occurrences of archeological remains encountered:

1. Information concerning the present spatial and environmental context of the remains;

2. Information concerning the relative or absolute dates of manufacture and deposition of the remains;

3. Information concerning the subsistence contexts conditioning manufacture and use of features and artifacts comprising the remains.

More detailed discussion of methodology employed to gather information during survey follows below.

METHODOLOGICAL CONSIDERATIONS

Units of Observation

One of the most common topics of professional debate which arises when survey methodology is discussed centers about the question "When do you call a site a site?" This question is predicated upon the fact that material evidence of past human behavior exhibits a considerable range of variability in its density distribution across the landscape. The archeological record of past human behavior within any project boundaries can be expected to vary from isolated artifacts or architectural features and low density "scatters" of artifacts, to spatial loci characterized by great numbers of architectural features and/or high densities of artifactual remains. The problem facing the archeologist is that of determining how this variability should be documented so it can be used as data to inform about past human behavior.

A commonly employed strategy has been to define "sites" or "site locations" as units of observation. Sites are generally defined as relatively high density clusters of architectural and/or artifactual remains occurring within definable spatial limits, which are presumed to represent loci of high intensity or long duration of human activities.

If field documentation is restricted solely to such loci,

however, much information about the overall operation of adaptive systems within regional or project boundaries is potentially lost. The structure of varying densities of material by-products across the landscape constitutes in itself a kind of information about the organization of adaptive behavior which should be monitored as well. For this reason, three units of observation were defined for the Cochiti Reservoir survey: isolated occurrences, site locations, and proveniences within site locations.

1. Isolated Occurrences

Isolated occurrences are defined as single occurrences of artifacts or features, or low density scatters of artifactual remains over very broad areas of landscape. These units of observation are differentiated from "site locations" in that they provide information about subsistence or settlement behavior primarily through analysis at a regional rather than locus-specific scale. In this sense, a single isolated sherd dating in manufacture to a particular period of Anasazi settlement may offer little or no information about specific subsistence activities carried out at the exact spatial locus where it is found: but the distribution of such isolated occurrences with respect to particular physiographic, soil and vegetative zones within a region may prove informative about overall strategies of land usage during that period of settlement. Distribution of isolated occurrences thus offer considerable potential for defining contexts of prehistoric trail usage, location and intensity of agricultural production activities, and a variety of other categories of behavior which cannot be expected to generate an archeological record in the form of substantial quantities or high densities of material by-products.

2. Site Locations

Site locations are defined as clusters of artifactual and/or architectural features which can be delimited spatially to a particular locale upon the landscape. Site locations are felt to represent spatial locales which potentially provide information about locus-specific subsistence pursuits through intrasite analysis of material remains. Site locations are thus differentiated from isolated occurrences as units of observation because they exhibit artifactual and/or architectural variability indicative of greater intensity, diversity or duration of behavior within definable spatial boundaries

3. Proveniences

Proveniences are defined as spatial locales within the boundaries of a site location which are characterized by observable differences in content and/or density of artifactual or architectural remains. Intrasite proveniences were in some cases defined in an attempt to isolate different temporal components of occupation at the site location, and in some cases were defined in an attempt to isolate differential utilization of site space within a single temporal component of occupation. The use of proveniences as units of observation thus permitted maximum flexibility in formalizing field observations of intrasite variability for purposes of documentation.

4. Discussion of Units of Observation

The definitions of units of observation discussed above essentially served as conceptual guidelines to aid in field documentation of archeological remains during survey. In this sense no attempt was made to delineate a set of formal, quantifiable criteria through which specific manifestations of archeological remains could be classified into categories of isolated occurrences, site locations or provenience locales within site locations. The ultimate analytical value in employing the categories was realized primarily as an increase of rigor in qualitative evaluation of those remains with respect to possible behavioral determinants of deposition and post-depositional erosional processes resulting in their present occurrence upon the landscape.

a. Isolated Occurrences and Site Locations

The operational distinction between isolated occurrences and site locations changed somewhat during the course of both surveys. Survey of the permanent pool area resulted in documentation of a greater number and variety of archeological phenomena as isolated occurrences than did survey of the flood control pool area. This was in part due to the fact that the first stage was restricted to land areas within the near vicinity of the Rio Grande River, and that a greater variety of archeological evidence of human behavior (especially historic behavior) was encountered. Especially prominent among those were "modern" hearths and campsites constructed and used by hikers and/or raft or boat parties. During the first few days of survey, each of these locations encountered were documented as site locations, although the majority were not characterized by associated artifactual remains or any substantive evidence of differential utilization of site space, recurrent occupation, etc.

As survey progressed, it became apparent that such hearths were present in greater numbers within 20 meters of the river's edge, and that "new" sites of this sort began to appear in previously surveyed areas, despite the season of year and short duration of elapsed time during which survey was conducted. An expedient decision was thus made that such phenomena could be documented as isolated occurrences. A similar decision was made with respect to occurrences of "river-side debris" in the form of cans, deposited along the margins of the river as a result of high water intervals.

During the course of the flood control pool survey, however, which was conducted for land areas substantially higher in elevation, occurrences of presumably "modern" hearths were documented as site locations rather than as isolated occurrences, largely because they were rarely encountered, and the behavioral contexts of their deposition could not necessarily be accounted for as well as those occurring within close proximity of the river.

In general, with the exception of truly "isolated" occurrences of single artifacts, all material phenomena observed during the course of survey of the flood control pool were documented as site locations. Low density occurrences of artifact scatters, and all architectural structures such as single walls, terraces, or rubble mounds whether or not associated with artifactual remains were documented as site locations as well.

Actual dimensions of site locations documented in this fashion ranged from 1.0 square meter to 160,000 square meters, and densities of artifactual remains comprising or associated with provenience locales within site locations ranged from 0.001 artifacts per meter square to 82.0 artifacts per meter square.

b. **Proveniences**

As noted previously the concept underlying definition of provenience locales within site location boundaries was directed toward two analytical concerns: first, to isolate possible temporal components of occupation at the same site location; and second, to isolate possible differences in activity utilization of site space within a single temporal component of occupation at the site location.

It is, of course, clear that precise definition of different temporal components of occupation of a single site location cannot be finitely posited during field survey. It is just as clear that precise spatial delineation of boundaries between areas of different activity performance within a site location cannot be undertaken as rigorously during field survey as could be undertaken through a program of excavation and laboratory analysis.

It is, however, equally clear that qualitative and quantitative variability with respect to kind and distribution of architectural and artifactual remains can be observed between and within site locations.

Formal delineation of intrasite proveniences was thus implemented in part as a standard survey procedure to capitalize upon this kind of cumulative perception which has in the past generally been relegated to a "comments" or "remarks" section of survey data.

Operational on-site definition of proveniences was undertaken with an understanding that a variety of behavioral circumstances might have conditioned the distribution of architectural and artifactual remains percieved on the surface of site locations being stratified. These circumstances outlined here are as follows:

1. A site location might owe its archeologically observable existence to having been selected as a locus for performance of a specific set of subsistence activities through the operation of a single adaptive system in the past. The degree of spatial segregation among material by-products of activity performance in such cases would be largely dependent upon the nature of site space utilization employed. Thus if different activities were performed at different spatial loci within the site location, the archeological record of those activities might be manifest as spatially segregated strata exhibiting different artifactual and/or architectural content.

If however, essentially similar activities were performed by different individuals or groups of individuals at different spatial loci within the site location, the archeological record of those activities might be manifest as spatially segregated strata exhibiting essentially similar artifactual and/or architectural content.

2. Some site locations can be expected to have been selected as loci for specific sets of subsistence pursuits by more than one cultural adaptive system in the past. Given the particular extrative or productive strategies through which those loci were selected by differing adaptive systems, the material by-products of subsistence oriented behavior may exhibit quite different spatial organization at the site location, and may exhibit considerable diversity in assemblage composition as monitored by technological, functional or architectural variability.

In some cases, the context of utilization of site space can be expected to result in differential spatial deposition of material remains attributable to different temporal components, while in other cases material remains attributable to different temporal components are essentially "stacked" at the same spatial locale within the site. It is clear that this kind of complexity in deposition cannot always be observationally resolved in the field. If, however, criteria of content, distribution and density of remains are employed to stratify the site into proveniences, the validity of field observation can be tested through quantified samples monitored for each defined provenience.

IMPLEMENTATION OF SURVEY

Procedure to Locate

A four to six person crew was employed to locate presence of architectural and artifactual remains within the project area. Foot coverage of land areas was employed throughout survey of the permanent pool and for most survey of the flood control pool. One exception to this strategy occurred during survey of the broad flood plain and low terraces comprising the northern bank of the Santa Fe River. This area was an open grassland and permitted use of a horse to cover the ground more quickly. One mounted crew member crisscrossed the northern side of the drainage and located sites and isolated occurrences with wire flags while the remaining crew members proceeded directly to those locations to document the remains. Total land area surveyed in this fashion amounted to ca. 800 acres (325ha).

Given the highly convoluted nature of the remaining landscape, intensive foot survey was conducted sequentially over small pre-determined portions of the land surface. Interval spacing of survey personnel ranged from 10 to 15 meters dependent upon vegetational cover and physiographic context. Ground cover by each crew member was undertaken in a "zig-zag" fashion. Each crew member was equipped with a bundle of color 30 inch wire flags for marking locations of architectural or artifactual remains; voice contact was maintained between personnel during locational sweeps of the portion of landscape being surveyed.

Upon completion of this locational stage, a brief conference was held to exchange information on the kind and densities of archeological remains encountered. Stratification of archeological remains into categories of isolated occurrence or site location was determined through evaluation of density relationships of artifactual or architectural debris and areas characterized by high densities of isolated occurrences as determined by flagged location and voice contact.

Definition of Intrasite Variability

Once defined, site locations were subject to a "flag sweep" by survey personnel in which crew members spaced themselves up to two meters apart and covered the entire extent of the site. During this sweep, flags were placed by each artifact. Flag colors were assigned to taxons of artifactual remains, for example, red flags signified silicious stone artifacts, yellow flags signified ceramic fragments, white flags signified nonsilicious stone artifacts, etc. On wholly lithic sites, flag colors were assigned to material taxons: red flags signifying obsidian; yellow flags signifying chalcedony, etc. In cases where artifactual remains were present in extremely high frequencies, this procedure was altered toward definition of boundaries for the site location as a whole, and toward

FIG. III.3.1 Typical flag display marking artifact distribution of a site.

defining spatial limits of differential artifact class and density relationships within the site location. This procedure enabled the survey crew as a whole to assess visually the limits and density of artifactual remains comprising the site location, and as well to assess intra-site variability in density and distribution of artifact classes.

Under completion of the "flag sweep" of a site location, another brief conference was held during which the structure of variability among classes of architectural and artifactual debris was evaluated according to criteria of spatial association and density relationships. Definition of provenience locales within the site boundaries were determined through consensus; sampling strategies were defined and documentation tasks were assigned during this conference. The value of the visual display of color coded flags across the site location cannot be overemphasized in importance for making decisions at this point.

Sampling Procedure

1. Decision to Sample

Data recording strategy dictated that all architectural features within each designated provenience be documented in detail. With respect to artifactual debris, including ceramics, lithics and historic artifacts, decisions to document *all* items visible on the surface or to document a *sample* of those items were made employing practical time/cost criteria based upon item counts or estimates. Initial item count estimates were made for each provenience after the "flag sweep" of the entire site location was undertaken. In those cases where artifact class frequencies within provenience loci were low, all items on the surface were documented on appropriate ceramic, lithic or historic artifact data forms.

If, however, the initial "flag sweep" of the site location resulted in definition of proveniences loci characterized by high frequencies of artifacts, a decision was made to document a spatially bounded sample of artifactual debris within each provenience. The primary objective was to obtain an estimate of the artifact content variability as well as an estimate of artifact density within the provenience locale.

2. Sample Unit Shape and Placement

Two strategies concerning choice of sample unit shape and placement within provenience locales were employed. Single quadrats, or essentially square units were employed as sample frames within proveniences during the initial part of the permanent pool survey but were soon abandoned for the following reasons:

a. Many site locations were situated on sloping terrain and it was perceived in some cases that erosional "sorting" had occurred from the top to the bottom of

the slopes. More massive artifacts tended to be distributed near the tops of the slopes, while artifacts of smaller mass such as small pieces of debitage were distributed in much greater frequencies near the lower reaches of the sloping surface. Since quadrat samples were restricted in their placement to a single block size portion of the provenience area, they did not encompass the entire artifact size variability exhibited at the provenience.

b. For the first few site locations in which quadrat samples were employed, it was observed that a great deal of lithic and ceramic class or taxon variability was not representationally encompassed within the sample unit.

It was thus felt that quadrat sample units failed to monitor adequately assemblage variability within proveniences, whether conditioned by behavioral contexts of artifact deposition, or by post-deposition erosional processes.

To alleviate at least this latter problem, a decision was made to employ transects, or linear rectangular units, as sample frames. In cases where sites or proveniences were situated on sloping terrain, these sample transects were oriented essentially uphill-downhill. On more level terrain, transects were placed approximately through the center and aligned along the long axis of the provenience locales being sampled.

Of the two sample units employed (quadrats and transects), it was determined in the field that transect samples provided a more reliable estimate of artifact size variability within a given provenience because they accounted for post-depositional erosional sorting of artifactual debris. Assessing the degree to which quadrat or transect samples provide better estimations of artifact taxon variability within a provenience locale is a more difficult problem which can only be approached through analysis of completely collected or excavated site locations. It was noted in the field that low-count artifact taxons (such as manos, metates or projectile points) were often not accounted for by either quadrat or transect sample units. For this reason, survey procedure was altered during the course of field work such that the presence of low count artifact taxon "missed" by transect sample unit placement within provenience locales were documented in addition. Care was taken in these cases to differentiate such artifacts from those documented within the sample unit.

3. **Sample Unit Size**

Sample units were employed to document only artifact classes exhibiting high item counts. Thus, if a provenience locale exhibited high counts of lithic artifacts, but low counts of ceramic fragments, sample transects were employed to document lithic artifact variability while all ceramic variability within the provenience locale was documented.

As discussed previously, the decision to document a sample of artifactual debris within a provenience was made when the initial "flag sweep" of the site location revealed such high counts of artifacts that time/cost considerations prevented documentation of all surficial remains observable. A primary objective of sampling was to obtain a "representative" description of artifact variability within the provenience locale, and a major problem resided in determining how large a sample would be documented. Two approaches were attempted in this regard. The first approach involved adjusting the sample frame size to encompass a standard fraction of total number of artifacts estimated to occur within the provenience locale. This procedure quickly proved unfeasible because reliable estimates of artifact counts could not be made prior to sampling. The approach was thus changed toward attempting to adjust sample frame size to encompass a minimum fraction of the total area defined within provenience boundaries. Since provenience size in square meters could be more reliably estimated than counts of artifacts within provenience boundaries, an attempt was made to adjust sample transects to encompass minimally 20% of total provenience area. Ultimately, however, time/cost considerations proved to be the final arbiter of sample unit size; in cases where extremely high densities of artifactual remains were present, sample frame size encompassed as little as 5% of the total provenience area.

It is felt that the sampling procedure employed resulted in reliable estimates of artifact densities within proveniences. The degree to which it provided information "representative" of artifact taxon or attribute variability within provenience locales is difficult to assess in the absence of controlled comparison between sample documentation and "whole provenience" documentation. It should be reiterated, however, that definition of provenience locales was undertaken to maximize information concerning intrasite variability in artifact distribution, while definition of sample unit shape, placement and size within provenience locales was directed toward maximizing information concerning intra-provenience variability.

DATA COLLECTION PROCEDURES: NONARTIFACTUAL

A series of data forms were employed to describe relevant variability concerning the spatial location and environmental setting of site locations and isolated occurrences, and to describe architectural and artifactual variability within provenience locales at site locations. Data recorded on these forms will be discussed below, and the reader is referred to Figs. III.3.2-10 for reproductions of each form.

The general strategy of description involved recording information about the setting, kind and relationship of proveniences and areal extent of a site location on the Site Data Form. Specific descriptions of architectural features and extent of artifactual debris were recorded on the Provenience Data Form; documentation of artifactual variability within provenience locales was undertaken, employing the appropriate Lithic, Ceramic, Historic Artifact or Petroglyph data forms.

Additionally, a sketch map was drawn of each site. This illustrated the plan of the site location, with emphasis upon the spatial relationships among architectural features, artifactual debris and immediate physiographic situation of the site. Also included were locations, sizes and shapes of sample units within proveniences. Both color and black and white photographs were taken to document the site setting, architectural variability and relevant artifactual variability. Color slides of artifact distributions, as revealed by color coded flags marking artifact occurrences and/or provenience boundaries were taken as well.

A variety of maps were used to document site locations. Elevation and legal location description were interpolated from 7.5 minute USGS topographical quadrangle

maps. Aerial photographic coverage of the survey region was not uniform and was obtained from a variety of sources. The U. S. Army Corps of Engineers, Albuquerque District, provided both a mosaic and individual 9 inch by 9 inch stereo photographs (1:26400 scale) of the expansive southern permanent and flood control pool area in the immediate vicinity of Cochiti Dam. Enlargements of strips from high altitude photographs covering areas from the mouth of White Rock Canyon to Alamo Canyon, and from the mouth of Frijoles Canyon to the northern extent of the survey areas, were obtained from Koogle and Pouls Engineering, Albuquerque. To fill the gap in coverage between Alamo and Frijoles Canyons, the Corps flew at low altitude in a helicopter to shoot two sets of vertical and oblique photographs.

All of the aerial photographs, particularly the stereo pairs, were superior to the USGS quadrangle sheets for accuracy in location. Individual trees and shrubs could be seen easily and relatively low topographical relief was discernable on the stereo pairs. Contour interval placement on the quad sheets was particularly inaccurate for the White Rock Canyon area and failed to reflect the existence or placement of many benches, terraces or talus formations where sites were situated.

Site Data Form (Fig. III.3.2)

The site data form was designed to act as a "cover sheet" for each site location. The categories of information recorded included a variety of locational and administrative data, data concerning the physiographic setting and situation of site location, data concerning the vegetational setting of the site location, and data concerning the kind, number and relationships of architectural and artifactual remains characterizing the site location.

Documentation of locational data, including Laboratory of Anthropology (LA) number, other names or numbers previously assigned to the site location, project name, cultural/temporal designation, elevation, Universal Transverse Mercator (UTM) coordinates, etc., was undertaken after the data form was returned from the field. Information such as field number, date recorded, name of recorder, site condition, mitigation estimates, photograph numbers, site dimensions, number of proveniences and data forms employed to describe architectural and artifactual variability were filled out in the field.

Provenience Data Form (Fig. III.1.3)

Aside from administrative information accounted for on the initial three lines of the form, provenience data was described according to an "open" format. The following set of criteria were employed to organize provenience descriptions.

1. **Structures** (including rubble mounds, rooms, walls, depressions, etc.)

   a. Dimensions (length, width and height) of rubble mound(s) or structure

   b. Number of rooms discernable by foundation outlines, and dimensions of each

   c. Constructional details:
      Materials (basalt, tuff, adobe, wood, etc.)
      Kind of elements (clasts, slabs, cobbles, etc.)
      Size of elements (ranges and means of length, width, thickness or diameters)
      Method of construction (mortared, drylaid, nailed, etc.)
      Shaping of elements (presence or absence of shaping, estimated percentage of elements shaped)
      Placement of elements (horizontally or flat, set vertically, rubble core, no discernable pattern, etc.)

2. **Hearths**

   a. Outline shape

   b. Dimensions

   c. Constructional materials

   d. Placement of elements

   e. Condition

   f. By-product of hearth usage (presence or absence of charcoal stains or firecracked rock; spatial dimensions and volume estimate if present)

3. **Artifactual Debris** (including ceramic fragments, lithic artifacts, industrially manufactured artifacts, etc.)

   a. Areal extent of distribution

   b. General description of kinds and density of debris

   c. Observations about possible behavioral determinants of deposition and effects of post-deposition wind or water erosion

   d. Location of debris with respect to architectural features or other artifactual debris proveniences within site location

The provenience data form proved to be an economical format for recording architectural and artifactual information in terms of time investment and flexibility in the field.

Isolated Occurrence Form (Fig. III.1.4)

The isolated occurrence form was employed to describe the kind, physiographic situation and vegetative situation of isolated artifacts, petroglyphs or architectural features. The spatial locations of these were plotted on USGS maps carried by each crew member. Description of physiographic and vegetative situation followed the format discussed for those categories on the site data form, and description of isolated occurrences themselves followed the format discussed for architectural and artifactual variability discussed for the provenience form. Documentation of isolated petroglyphs was undertaken on an attached pictograph/petroglyph data form.

Pictograph and Petroglyph Form (Fig. III.1.5)

This data form was designed to monitor variability in condition, technique and design of painted, pecked, scratched or incised designs found on boulders, shelters or cliff faces. The form is largely self-explanatory. Black and white photos were taken of each occurrence of petroglyphs and pictographs.

SITE DATA FORM

LA No. ______________ Other Designations ______________

Project ______________ Cultural/Temporal Type ______________

Elevation ______________ Long. ______________ Lat. ______________

USGS Quad ________ T ________ R ________ Sec. ________ ¼ Sects ________

Drainage: Primary ______________ Secondary ______________

Field No. ______________ Date ______________ Recorder ______________

Magnetic Reference ______________

Site Condition: Eroded ______ Vandalized ______ Undisturbed ______ Surficial ______ Stratified ______
Comments:

Mitigation Estimate (man days): Intensive Collection ______________ Excavation ______________
Comments:

Photo Nos.: B/W ______________ Color ______________

Physiographic Setting: ______________

Physiographic Situation: Exposure ______________ Slope ______________ Soil Structure ______________
Description:

Vegetation: Dominant Species: ______________
Vegetative Structure:

Dimensions of Site: ______________
Number of Provenieces: ________
Forms: Provenience ___ Lithic ___ Ceramic ___ Historic ___ Ground Stone ___ Petroglyph ___ Map ___
Kind and Relationship of Proveniences:

FIG. III.3.2 Site Data Form

PROVENIENCE DATA FORM

Site Field No. ____________ Provenience No. ____________ Site LA No. ____________ Date ____________

Recorder ____________________ Photo No.: B/W ____________________ Color ____________________

Forms: Lithic __________ Ceramic __________ Historic __________ *Petroglyph* __________ Maps __________

Provenience Description:

FIG. III.3.3 Provenience Data Form

ISOLATED OCCURRENCE FORM

Field No. ______________ Kind ______________ Date ______________ Photo No. ______________

Physiographic and Vegetative Situation: ____

Description: (Include quantity, areal extent, density and photo Nos.)

FIG. III.3.4 Isolated Occurrence Data Form

PICTOGRAPH AND PETROGLYPH RECORD SHEET

Site No.: ______________________ Project: ______________________

Recorder: ______________________ Date: ______________________

Condition: Undisturbed ___
Vandalized ___
Slightly Weathered ___
Heavily Weathered ___

Technique: Incised ___
Pecked ___
Painted ___
Combination ___

Associated Cultural Remains: yes __________ no __________ other __________

Photographs: B/W ______________________ Color ______________________

Additional Drawings/Rubbings: yes ______________________ no ______________________

Description of Examples of Panel Drawn:

Sketch of Panel __________ Major Elements __________ Or Grafitti __________ (Scale) __________

FIG. III.3.5 Pictograph and Petroglyph Record Sheet

DATA COLLECTION PROCEDURES: ARTIFACTUAL REMAINS

No Collection Strategy

The intent of legislation under which intensive survey of the Cochiti Reservoir permanent and flood control pools was implemented is predicated upon recognizing archeological remains as limited and nonrenewable cultural resources. It is an accepted fact that any archeological investigation of a site location which involves removing artifactual remains from their context of occurrence is a form of physical destruction of the archeological record. This is obvious if such removal involves excavation; it is in recognition of this fact that the professional archeological community places such great emphasis upon training in observation and recording contextual relationships of artifactual remains recovered during the course of excavation.

Removal of artifactual remains from the surface of site locations during survey constitutes no less a destruction of the contextual relationships which pertain among artifactual and architectural remains. This is especially true in those cases in which the behavioral contexts of deposition and the vagaries of post-depositional erosional process have resulted in an ephemeral and often entirely surficial record of human behavior at a particular spatial locus.

Archeological resources situated within the confines of Cochiti Reservoir constitute in many ways a special case with regard to this mitigative alternative in that all will be subjected to varying degrees of shoreline wave action, inundation and silt deposition in the future. The effects of these processes are poorly understood at present. Given this consideration, avoidance or physical preservation of archeological resources within a projected reservoir context cannot be dismissed as a potentially viable mitigative alternative.

A second consideration which must be taken into account when dealing with the impact of collection policies resides in the potentially detrimental effect artifact collection during survey might have upon the scope of problem oriented analysis of site locations selected for future mitigative action. Selective removal of "diagnostic" artifacts or intensive areal collection from site surfaces can severely limit the scope of any future research problems which necessitate spatial analysis of artifact distributions within a site location.

A third consideration of collection policies which must be dealt with at a practical level are attendant time and cost parameters. Field collection of artifacts is only the first step of an often lengthy and expensive program of transportation, washing, labeling, analysis and curation which must be met if such collection is to be legally and ethically undertaken. If, however, research problems are delineated in a fashion permitting specification of relevant attribute variability which can be monitored in the field, those data can be collected as information and do not have to be collected as artifacts.

For these reasons, it was decided that a "no collection policy" during survey of Cochiti Reservoir could be implemented as a viable solution to both research and conservation needs of the project. Information about artifactual remains on the sites were recorded on the appropriate data forms and are discussed below.

Lithic Data Form (Figs. III.3.6-7)

The lithic data form was designed to monitor variability among stone artifacts which could be used to inform about strategies of material selection, tool manufacture and tool use within provenience locales.

The rationale conditioning selection of attributes monitored during survey, and definitions of attributes themselves can be found in Chapman and Schutt in Volume 2. Although the lithic data form underwent substantial change in structure between survey of the permanent pool and flood control pool, the basic strategy of documentation remained similar. All lithic artifacts within a provenience, or sample unit, were first flagged. Each artifact was then examined in turn for the presence or absence of a finite set of attributes, and then documented on the appropriate place or places in the data matrix comprising the form.

If all surficial stone artifacts within a provenience locale were recorded, "All Recorded" was checked at the bottom of the form. If a sample transect within the provenience was employed for documentation, the dimensions of the transect were entered as "Size of Sampling Unit."

The following discussion will briefly outline differences between formats for monitoring lithic artifact variability on permanent pool survey (Fig. III.3.5) and survey of the flood control pool (Fig. III.3.6). The reader is referred to Chapman and Schutt (Volume 2) for more detailed definition and description of taxons and attributes discussed below.

1. Material

Seven material categories were monitored during the permanent pool survey. These included obsidian, basalt, chert, chalcedony, quartzite, sandstone and other (Fig. III.3.6). These materials were initially monitored "generically" (e.g., obsidian vs. basalt). It became apparent during survey that subtaxons of some materials, especially obsidians, cherts and chalcedonies, could be defined. For approximately 60% of the site locations descriptive subtaxons (e.g., Pedernal chert vs. other chert) were recorded.

For survey of the flood control pool, a four-digit number code classification developed by A. H. Warren for the Laboratory of Anthropology was employed to describe material taxons. Material descriptions and code numbers used are discussed in Section II of this volume. Type specimens of materials were carried in the field by the survey crew to facilitate classification. When artifacts were encountered which were not accounted for by the lithic code, they were assigned a provisional number or letter designation and described in detail for future identification. An attempt was made to collect nonartifactual specimens of "unknown" materials where possible.

2. Debitage Attributes

a. Size

Size of debitage was not monitored during survey of the permanent pool (Fig. III.3.6), but it was observed during the course of fieldwork that a considerable amount of intersite and interprovenience variability in size of debitage was evident, and that in many cases debitage size seemed to be varying independently of material type. For this reason, five categories of size were moni-

LITHIC DATA FORM

Field No. ____________ LA No. ____________ Provenience No. ____________

Recorder ____________ Date ____________ Project ____________

Material	Obsidian	Basalt	Quartzite	Chert	Chalcedony	Sandstone	Other
Unrt. Debitage							
Cortex							
No Plt							
Unprp Plt							
Prp Plt							
No Cortex							
No Plt							
Unprp Plt							
Prp Plt							
Ret. Debitage							
Cortex							
No Plt							
Unprp Plt							
Prp Plt							
No Cortex							
No Plt							
Unprp Plt							
Prp Plt							
Uniface							
Biface							
Core							
Chopper							
Hammerstone							
Mano							
Metate							
Other							

Artifact Descriptions: Yes ______ No ______
(If Yes, use back of form)

Assemblage Observations: All Recorded ____________ Size of Sampling Unit ____________

FIG. III.3.6 Lithic Data Form (Permanent Pool)

LITHIC DATA FORM

Field No. ________ LA No. ________ Provenience No. ________

Recorder ________ Date ________ Project ________

Material Code		
Debitage	Unutilized Unretouch	1
		3
		4
		5
	Utilized	1
		2
		3
		4
		5
	Marginally	1
		2
		3
		4
		5
	None	
Cortex	Platform only	
	Dorsal only	
	Plat. & Dorsal	
	Platform only	
	Dorsal only	
	Plat. & Dorsal	
	Angular with Cortex	
	Debris W/out Cortex	
	Rejuvenation Flake	1
		2
		3
	Retouch Flake	1
		2
		3
	Biface	
	Core	
	Hammerstone	
	Other	
	Other	
	Other	

Size 1 2 3 4 5
0 1 2 3 4 5 6 7 8 9

Artifact Description: yes ________ no ________
(if yes, use back of form)

All recorded ________

Size of sample unit ________

Comments

FIG. III.3.7 Lithic Data Form (Flood Control Pool)

tored for debitage during survey of the flood control pool (Fig. III.3.7). A scale providing both centimeter units and size categories was printed at the bottom of the form to facilitate measurement. Debitage was measured along an axis defined through the proximal and distal ends.

b. Retouch

A piece of debitage was considered to exhibit retouch if some portion of its perimeter was marginally retouched either unidirectionally or bidirectionally. Artifacts exhibiting unifacial or bifacial retouch were documented as "bifaces" or "other" taxons.

c. Cortex

During survey of the permanent pool, the presence or absence of cortex irrespective of placement or kind was monitored for debitage. It was observed in the field that the locus of cortex on debitage (platform or dorsel surface) seemed to be indicative of different techniques of reduction of some materials. It was also observed that the kind of cortex (waterworn or not waterworn) was potentially informative about source locations of some materials as well. The lithic data form used for survey of the flood control pool was thus designed to account for presence or absence and variability in placement and kind of cortex exhibited by debitage. Cortex variability was monitored independently of debitage size, retouch and utilization. The term "cobble" on the second lithic data form (Fig. III.3.6) refers to waterworn cortex.

d. Platforms

During survey of the permanent pool, documentation of debitage platform variability was limited to monitoring, in addition to the presence or absence of platforms, whether platforms exhibited a single facet or surface ("unprepared" platforms), or whether they exhibited multiple retouch scars indicative of the debitage having been detached from a previously retouched edge margin ("prepared" platforms).

During survey of the flood control pool, debit[illegible]ge exhibiting "prepared" platforms were monitor[illegible] two separate taxons. "Rejuvenation flakes" exhib[illegible]epared platforms with evidence of prior utilization, while "retouch flakes" exhibit prepared platforms with no evidence of prior utilization.

e. Angular Debris

Angular debris (see Chapman and Schutt, Volume 2) was not monitored as a taxon during survey of the permanent pool although it was added to the second lithic data form. Size variability for angular debris was not accounted for, but the presence or absence of cortex was monitored.

3. Unifaces and Bifaces

Facially retouched artifacts were entered as letter codes in the data matrix comprising both forms, and were drawn to actual size of scale on the back of the form. It was found that actual size drawings of obverse, *reverse* and *cross-section* could be done quickly in the field, and provided better information concerning artifact morphology than did description.

4. Other taxons

Documentation of expected low count taxons of lithic artifacts such as cores, hammerstones, manos, metates, axes, etc., was undertaken by frequency count within relevant material types. The first data form included space for choppers, manos and metates in addition to cores and hammerstones, but these taxons occurred so infrequently that they were dropped from the second data form and entered as "other" when found. A data form was designed to document ground stone variability, but proved infeasible in the field. Manos and metates were thus briefly described on the back of the lithic data form, and illustrated by plan view and cross-section.

5. Utilization

Evidence of utilization was not monitored during permanent pool survey, but it became apparent that gross evidence of utilization could be readily discerned with 20x hand lenses. Utilization was thus added as a criterion for description of debitage variability on the lithic data form employed for survey of the flood control pool.

6. Comments

The lithic data form in its final stage of evolution (Fig. III.3.7) proved to be a very efficient tool for monitoring lithic artifact variability in the field, given proper training time can be minimized if specimens of material types and artifacts exhibiting attribute variability to be monitored are available for pre-field examination.

Data gathered through use of the form not only provides an immediate assessment of assemblage variability with respect to material selection, tool manufacture and tool use, but can be easily coded for computerization. Limitations of the format reside primarily in the fact that covariations of size and cortex variability cannot be retrieved. The consensus of the field crew suggested that if the format were changed to monitor attribute variability on a flake by flake basis (which would permit maximum analytical flexibility), time investment in the field would not be substantially increased.

Ceramic Data Form: Permanent Pool Survey
(Fig. III.3.8)

Prepared by A. H. Warren

Two very different field strategies were employed to document ceramic artifact variability on survey of the permanent pool and survey of the flood control pool. The ceramic data form used during the permanent pool survey was designed by A. H. Warren, who prepared the *following discussion as well.*

1. Methodology

A two day training session on ceramics was conducted for members of the survey team prior to the commencement of the fieldwork. Since a "no collection" policy was established, and the number of sherds at each site was expected to be minimal, efforts to obtain maximum information from the field data seemed essential.

Literature relating to pottery typology in the upper Middle and Upper Rio Grande region was reviewed in order to obtain as complete a compilation of ceramic data as possible for both local and intrusive types that might be expected to occur in the White Rock Canyon area.

CERAMIC DATA FORM

Field No. L.A No. Provenience No.

Project Recorder Date

Pottery Type	Bowl	Olla	Other	Totals	Pottery Type	Bowl	Olla	Other	Totals
Santa Fe B/W Galisteo B/W Wiyo B/W Abiquiu B/G Bandelier B/G Sankawi B/G Carbon/white					Agua Fria G/R San Clemente G-P Cieneg. G/Y Cieneg. G-P Largo G/Y Largo G-P Espinoso G-P San Lazaro G-P Puaray G-P Kotyiti G-P Salinas Red				
Red Mesa B/W Kawahe'e B/W Mineral/white									
La Plata B/R St. Johns P. Heshota P. Mineral/red Carbon/red					Unid. G/R Unid. G/Y Unid. G-P Unid. red Unid. white				
Tewa Poly. Posugue Red Kapo Black Ogapoge Poly. Powhoge Poly. Carbon Poly.					Puname Poly. Casitas R/B Red/tan Ashiwi Poly. Mineral Poly.				
Lino Gray Corrugated Cor. Diag. Clapboard Ribbed Plain Incised Washboard					Corona Plain Potsui' Inc. Plain Smooth Plain striated Plain Mica. Sl. Plain Mica.				
					Black IC Black IC mica. Polished Brown				
TOTALS									

Assemblage Observations: All Recorded ______________ Size of Sampling Unit ______________

Remarks:

FIG. III.3.8 Ceramic Data Form (Permanent Pool)

AD-A138 981 ARCHEOLOGICAL INVESTIGATIONS IN COCHITI RESERVOIR NEW MEXICO VOLUME 1 A S..(U) NEW MEXICO UNIV ALBUQUERQUE DEPT OF ANTHROPOLOGY J V BIELLA ET AL. JUN 77 3/4

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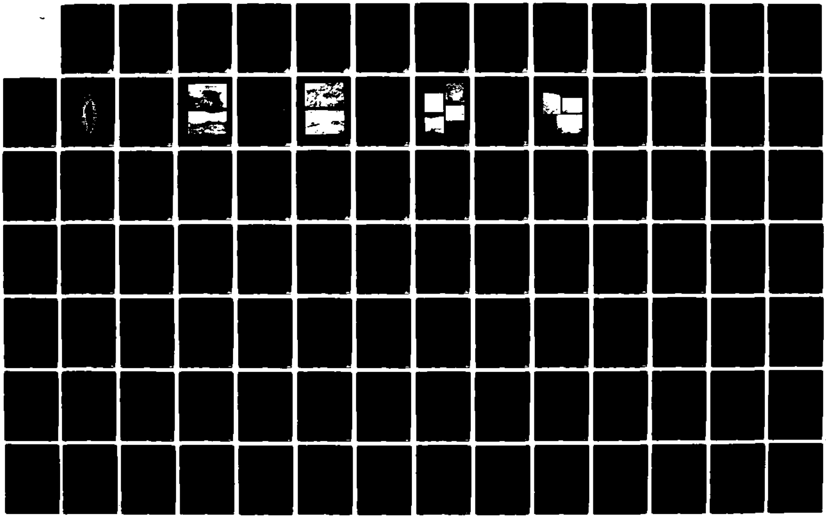
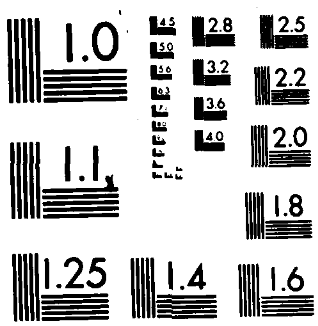




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Pottery types were grouped by paint variety and surface color combinations, as these attributes are those most commonly used to distinguish ware in the Rio Grande. Established type names were used, but groupings did cut across ware boundaries in some cases, in order to include intrusive or trade pottery.

The distinguishing characteristics of each pottery type, as well as its time range, were listed. The attributes were kept to a minimum wherever possible, as only hand specimen analysis would be possible in the field. Division lines between pottery types are always arbitrary, but efforts were made to emphasize those attributes which could be observed in hand specimen and would reflect cultural, chronological or technological differences.

A survey form for ceramics, based upon the field classifications, was designed, including those types that were most likely to occur and with room for write-in additions. Provision for indicating vessel form was also added. Utility wares could not be listed by pottery name, although descriptive terms were used, such as "plain incised," "clapboard," etc.

2. Description of Ceramic Types

Ceramic type descriptions are presented for those taxons which were expected to occur at site locations within the project area, and are summarized in Table III. 3.1. This table lists type names, dates of manufacture, and a brief outline of distinguishing features for each ceremic type.

TABLE III.3.1

Ceramics—Distinguishing Features

Carbon Painted Wares

Santa Fe B/W	1175-1300	Fine textured, compact clay body; usually hard, brittle, gray. Fine grained temper, mostly glass shards and silt; may be slipped.
McElmo B/W	+1250	Fine sandy texture. Designs usually narrow parallel lines.
Gallina B/W	?1200-1350?	White slip, polished interior only; sandstone, pumice temper.
Vallecitos B/W	?1075-1250	Polished, crackled surface, both sides; tapered to squared rim + ticking; wide design bands, pendent lines: Sosi and Dogozshi styles; sherd, sandstone, igneous rock tempers.
Galisteo B/W	?1250-1350	Polished, often crackled surfaces, both sides: tapered to squared rims: designs Sosi, Dogozshi styles; pendent dots; checkerboards; sherd, local Rio Grande rock temper.
Jemez B/W	1300-1750	Slipped polished both sides; carbon paint has tendency to turn brown or red; crystal pumice temper in dark gray clay.
Wiyo B/W	1300-1400	Clay tan, gray, olive, soft, biscuity; polished, slipped inside (bowls only); designs solid black, "bold." Vitric tuff temper usually.
Abiquiu B/G	1350-1450	Polished interior; unpolished, unslipped exterior; pumice shard temper; fine to broad line, pendent dots, triangles, interior only, rims may be ticked. May be slipped. Gray clay.
Bandelier B/G	1425-1550	Polished both sides of bowl, may be slipped; pumice temper; designs as above, but on both sides of bowls. Gray clay.
Sankawi B/C	1500-1675?	Cream colored slip, tan clay; pumice shard temper; polished, dull surface; thin line designs; parallel lines framing dots common.

TABLE III.3.1 (con't)

Mineral Painted Wares		
White Mound B/W	675-900	Rough surfaced + slip; chevrons; "Z's," triangles characteristic designs; sandstone temper. Bowls hemispherical.
San Marcial B/W	600-850	Polished surfaces; white clay; red, brown, or black paint.
Kiatuthlanna B/W	825-900	Polished both sides; designs radial panels, checkerboard; crosses, zigzag lines; bowl form conical. Sandstone temper.
Red Mesa B/W	875-1050	Polished + slip; sherd temper; designs pendent dots, triangles, scrolls, ticking, stepped elements, checkerboards, keys.
Cortez B/W	900-1000	As above, igneous rock, sandstone, or sherd temper.
Puerco B/W	1010-1125	Polished + slip; Sosi style design, broad line geometric.
Mancos B/W	950-1150	Polished + slip; designs solids repeated, hatching (Dogozshi); black, greenish, or tan paint; conical bowl forms. Temper like Cortez B/W.
Socorro B/W	1050-1275	Fine hatched designs; gray indurated clay; sherd temper; (solid Sosi style may be Puerco or Cebolleta).
Kwahe'e B/W	950-1225	Polished interior + slip; grayish brown clay, indurated; sherd, temper, Sosi, Dogozshi, other design styles.
Glaze Pottery		
Group A: Characterized by direct parallel-sided rims; crushed sherd or rock temper; glaze paint; bowls, ollas.		
Agua Fria G/R	1315-1425	Red surfaces inside and out; design simple geometric, encircling bands.
Arenal G-P	1315-1425	As above but with fine white line design on exterior.
San Clemente G-P	1315-1425	One surface of bowls red, the other white or tan.
Cieneguilla G/Y	1315-1425	White, yellow, tan, cream, or pink surfaces.
Cieneguilla G-P	1315-1425	As above but with glaze outlined red matte design elements.
Group B: Thickened, expanded lip or rim; crushed rock temper.		
Largo G/Y	1400-1450	Cream or white slip both sides; rarely pink.
Largo G-P	1400-1450	Glaze outlined red matte designs; rarely has red surface(s).
Group C: Short everted or beveled rims. Cream, white, pink or red surfaces, may be mixed. Glaze outlined red matte designs.		
Espinoso G-P	1425-1490	As above, Red matte designs mainly on bowl interiors; olla exteriors.

TABLE III.3.1 (con't)

Pottery Mound G-P	1400-1490	Orange surfaces with glaze outlines red matte designs.
Kuaua G-P	1425-1490	Sharply everted rims; interiors of bowls not decorated.
Group D: Long thickened rims, often everted; may have interior carina. Glaze outlined red matte designs on both sides usually.		
San Lazaro G-P	1490-1515	Pink, orange, red, white surfaces, often mixed. Tapered rims.
Group E: Long thickened rims with exterior carina; or thick short rims with inward curve. Glaze outlined red matte designs.		
Puaray G-P (early)	1515-1600	Orange, red, white surfaces, may be mixed; rims may be beveled to exterior. Overall good workmanship.
Puaray G-P (late)	1600-1650	Runny glazes, streaky slips.
Pecos G-P	1600-1700	White slips, short, thick rims; sandstone temper. May have red surface(s).
Group F: Long, parallel sided rims, with exterior carina at base. Duochromes more common than in earlier group. Runny glaze paints.		
Kotyiti G-P, G/Y, G/R	1650-1700	Includes carinated bowls, ollas with sharply everted rims; shouldered bowls; soup plate forms, pitchers.
Salinas Red	1650-1700	Polished redware; forms and temper similar to Kotyiti glaze types.
	Black-on-Red Pottery	
La Plata B/R	800-1000	Red slip smoothed and polished; well executed, medium-line geometric designs; igneous rock temper (with hornblendes).
Puerco B/R	1000-1200	Slipped and polished; solid line designs; Sosi style. Sherd temper.
Wingate B/R	1050-1200	Hatching scrolls, Dogozshi or Tularosa style; sherd temper.
St. Johns Polychrome	1175-1300	Hatching, scrolls, Tularosa style; exterior has broad white line designs; sherd temper.
Heshotauthla Polychrome	1300-1375	Black glaze interior designs; fine white line design exterior. Sherd temper; rims rounded, beveled.
"Tewa" B/R	1680-?	Black carbon paint on red or pink surfaces; forms like associated historic vessels; temper varied.
	Historic Carbon Paint Pottery	
Tewa Polychrome	1675-1720	Fine line designs on polished white slips; red underbody; carinated bowls; vitric tuff temper; also crystal pumice.
Posuge Red	?1675-?	No designs; well polished; vitric tuff temper; also sandstone.

TABLE III.3.1 (con't)

Kapo Black	?1650-?	Polished gray or black surfaces; vitric tuff, sandstone temper (red slipped, then smudged).
Potsui'i Incised	?1450-1550	Geometric fine line incised designs, on smoothed tan surfaces; may have mica slip; vitric tuff temper.
Ogapoge Polychrome	1720-1800+	Carinated bowls, ollas + red matte designs; vitric tuff, crystal pumice temper.
Powhoge Polychrome	1760-1900?	No carinas, red rims early, black rims late; vitric tuff, crystal pumice temper.
	Historic Mineral Painted Pottery	
Puname Polychrome	1680-1780+	Carinated bowls; jars: red, black paint; basalt, crystal pumice temper. Post -1780, rounded forms.
Gobernador Polychrome	?1690-1775?	Carinated bowls; dense, hard tan clay; unframed red paint designs. Temper varies, siltstone to sherd.
Casitas R/B	1740-1900?	Broad red line designs on polished buff surfaces; temper crystal pumice, sandstone, etc., coarse grained.
Red-on-Tan, Misc.	?1750-?	Red line designs on buff surfaces, chevrons, slashes, narrower lines than above.
Ashiwi Polychrome	1700-1770	Acoma or Zuni; feather symbol designs; sherd temper.
Hopi pottery		Dense, yellow, often untempered, hard clay body. San Bernardo (1600-1750) has crude black and red painted designs.

Ceramic Data Form: Flood Control Pool Survey (Figs. III.3.9a, b, c)

During survey of the flood control pool, a different strategy of ceramic data collection was employed. The first ceramic data form was designed to collect ceramic "type" information. During the course of the survey of the permanent pool, it became apparent that many traditionally accepted ceramic types were not actually defined by mutually exclusive sets of attribute criteria (paste, temper, slip, design, etc.), and that decisions to classify particular sherds into one ceramic taxon or another could not be made solely on the basis of attribute combinations. This fact resulted in an inability among individual crew members to replicate classification employed by other crew members for some taxons of ceramics.

It was felt that these taxonomic problems could be avoided if a form was designed to document ceramic attribute variability rather than ceramic taxon variability, and such an approach was taken during survey of the flood control pool. This data collection procedure involved the use of a dictionary listing specific attributes of temper, past, slip, paint, ect., which were numerically coded on the data form for each ceramic fragment encountered.

The data form was designed and implemented as an experimental collection technique, and its use demonstrated both benefits and liabilities. Primary benefits resided in increasing the replicability of data gathered, and in reducing the amount of time involved to train crew members in the use of the form. Training time necessary for recognition of ceramic attribute variability is essentially the same, whether that variability is used to define ceramic taxons or not. Definition of replicable ceramic "types," given the fact that the majority of recognized "types" employed in the Southwest at present are not defined as taxons on the basis of mutually exclusive sets of attribute criteria, is not an easily or quickly learned skill. For this reason, replicability of attribute documentation between individual crew members is considerably better than replicability of ceramic "type" variability. It was also demonstrated that field time investment in documenting attribute data was about the same per sherd as that spent in documenting ceramic "type" data.

Two major liabilities in the use of the form were demonstrated as well. The first of these involved difficulty in recognizing temper variability in the field with hand lenses. To resolve this problem, small "snip" samples of sherds exhibiting representative temper were collected in the field for later laboratory analysis.

A second, and more critical liability, resided in the cumbersome format employed for attribute documentation. The ceramic data form was actually comprised of

Project: **Recorder:** **Date:**

Field No.: **LA No.:** **Provenience No.:**

Carbon Paint Polychrome Series, Attribute Form **Page No.:**

Vess. Form	Rim Form	Atmos.	Temp.	White Loc.	Slip Col.	Def.	Overl.	Red slip Locat.	Unslip. Loc.	Fin.	Decorations LB	FL	RDec.	Des.	No. Snip

Mineral Paint Polychrome Series (Puname Group), Attribute Form **Page No.:**

Vess. Form	Rim Form	Atmos.	Wall Thick	Temp.	Int. Fin.	Int. Col.	Ext. Slip	Ext. Paint	Decorations Red D.	R.M.	Black Designs	No. Snip

FIG. III.3.9 Ceramic Artifact Form—Flood Control Pool Survey

Glaze Ware, Attribute Form

Page No.:

Vess. Form	Bowl Rim	Jar Rim	Keel	Temp	Atmos.	Slip Int.	Color Ext.	Slip Int.	Paint	Glaze Ext.

Prehistoric White Wares, Attribute Form

Page No.:

Vess. Form	Rim Form	Temp.	Atmos.	Slip Locs.	Defects	Paint Type	Type Taxon	Snip No.

FIG. III.3.9 (con't)

Plain Polished Wares, Attribute Form

Page No.:

Sp. No.	Vess. Form	Rim Form	Wall Thick	Atmos.	Temp.	Mica	Int. Color	Int. Fin.	Ext. Color	Ext. Fin.	Snip No.

Utility Ware, Attribute Form

Page No.:

Sp. No.	Vess. Form	Rim.	Wall Thick	Atmos.	Temp.	Ext. Treat	Ext. Color	Int. Fin.	Int. Color	Snip No.

FIG. III.3.9 (con't)

six data matrices, each of which was specific to a set of wares (plain polished wares, utility wares, glaze wares, white wares, carbon paint polychrome wares and mineral paint polychrome wares). In many cases, different kinds of attributes were monitored for each set of wares and specific two digit codes used to describe attribute variability within an attribute class (such as "temper," "interior finish," etc.) had different attribute referents depending upon which ware series was being monitored.

This lack of uniformity in coding was not a major liability during field documentation because code dictionaries specific to each ware series were employed. It was found, however, that the format was extremely cumbersome to computerize because it necessitated developing six different formats to describe attribute variability for each assemblage, and presented a very complex problem for information retrieval.

Because of these difficulties, attribute data documented through use of the form was used in conjunction with collected "snip" samples to essentially reconstruct a taxonomic and morphological description of ceramic assemblages. A. H. Warren's comments upon this procedure are included below.

In summary, it is felt that the ceramic data form offers considerable potential as a format for survey documentation of ceramic variability, but would be most profitably used in the context of a well defined problem orientation. The specific problems for which ceramic variability was being monitored during the Cochiti Reservoir survey were those of determining the date of manufacture of ceramics, and determining the kinds of activities necessitating use of ceramic vessels at particular provenience and site locations. These problems can be approached through field documentation of taxon variability using a format like that employed during survey of the permanent pool. The replicability of such documentation, however, is largely dependent upon individual expertise of a kind not generally available for each survey crew fielded, given personnel availability and current wage scales. The attribute format developed for survey of the flood control pool demonstrated that this field personnel problem can be solved, but demonstrated as well that considerable modification of the format structure is needed before it can be employed as a viable and efficient analytical tool.

Comments on Analytical Usage of the Flood Control Pool Ceramic

Prepared by A. H. Warren

During the survey of the flood control pool, pottery found at sites were coded by attributes. Except for small fragments of some potsherds which were of questionable typology, sherds were not collected and returned to the laboratory. The observations or remarks of the surveyor, or suggested ceramic type names, were usually omitted, but would have been most helpful in assessing the ceramics of each site in the laboratory.

In order to determine the meaning of pottery observed at the various sites in terms of chronology, cultural affiliation or ceramic classification, it was necessary to attempt to correlate attributes listed on the field forms with attributes listed for pottery types in the upper Rio Grande Valley. The attempt to relate field collected attributes with the established body of information resulted in some guesswork.

A stereomicroscope was used to examine the sherd fragments collected by the survey crew. The type of clay, temper, and construction gave additional information which enabled identification of most of the coded sherds. Body sherds of Rio Grande Glazes are generally not classified in absence of rims, but earlier data, concerning distribution of temper types obtained in studies of Cochiti and Pajarito pottery enabled classification in many cases, or grouping into early or middle glazes (i.e., early or middle P-IV) in most instances.

This data was then applied to similarly coded sherds wherever possible, and indicated chronology applied. The results corresponded very well with ceramics from the known occupations of large P-IV pueblos in the Cochiti, Pajarito and Mesa Negra areas.

Black and white pottery was classified in the field and presented little problem in identification. Fragments of historic sherds were taken in most cases and in turn allowed easy identification.

Historic Artifact Data Form (Fig. III.3.10)

Prepared by Emily K. Abbink and John R. Stein

The historic field data form was designed specifically to monitor mass produced commercial items. These begin to appear in the Southwest in abundance during the last half of the 19th century, as a result of continually increasing articulation of New Mexican populations with the industrial economy of the United States. These items were first transported into New Mexico via the Santa Fe Trail in the 1820's, but were not generally available to the rural populations at this early date. Increasing frequencies of these goods subsequently arrived in the region, and were broadly distributed as a result of military operations in the 1840's and 1860's and most importantly, through the arrival of the railroads in the 1880's.

With the railroads came the immediate expansion of Anglo influence, and corresponding social, economic, and technological changes. Commercial products, particularly those arriving by rail in the 1880's, were designed to be inexpensive and widely available, and were quickly utilized by all cultural groups in the Southwest, replacing native industries in many cases. An example of this trend is illustrated through the change in native ceramic industries caused by the introduction of enamelware, which were cheap, durable, lightweight and easily cleaned.

Of the massproduced items which occur in the archeological record, containers, both of glass and metal, are possibly the most sensitive to technological and economic change. Collectively, they have high information potential for temporal and functional considerations of site usage, and are oftentimes the most common and durable artifacts found on recent archeological sites. Containers are designed to be convenient and disposable, in many instances "advertise" their contents, and are of limited utility once their contents are consumed. Hence, they are rarely curated for any length of time and are usually discarded on the spot. Readers may refer to the following sources, as per bibliography: Fontana *et al.* 1962; Lief 1965; Lifshey 1973; Lorrain 1968; Paul and Parmalee 1973; and Riley 1958.

The historic data form (Fig. III.1.10) stresses the recording of glass and metal container attributes. These items exhibit high information potential because of their general abundance, the immediate nature of their dis-

HISTORIC ARTIFACT DATA FORM

Project: Field No.: LA No.: Provenience No.: Recorder:

Glass Containers												
Type & Contents	Glass Color	Closure				seam over closure	reuse	volume	Labels		Embossed	Date (lab use only)	photo no.
		crown cap	screw	cork	other				silk screen	paper			

Cans																	
Type & Contents	Opening		Procedure				volume	Seams		Material		Labels		reuse	embossing	Label Emboss.	Container Shape	Date (lab use only)	photo no.
	replaceable lid	pop top	key	knife	twist	other		soldered	crimped	aluminum	steel	silk screen	paper						

FIG. III.3.10

HISTORIC ARTIFACT DATA FORM

Describe and discuss the following:	
Nails:	
Cartridges:	
Enamelware:	
Plastics:	
Barbwire:	
Lumber:	
Reuse (secondary):	
Misc./Other:	

FIG. III.3.10 (con't)

posal, the persistence of forms dictated by contents, and the availability of documentation concerning their dates of manufacture. The form was designed to facilitate preliminary analysis of relevant container attributes in the field to be used for derivation of temporal and functional information. In addition, space on the form was reserved for comment on additional container variability not monitored specifically by the form, and for documentation of commonly found, though less informative, items of material culture. Field personnel attended training sessions to familiarize themselves with the use of the form and examples of historic materials.

The following is a list and short description of those categories included on the form.

Attribute Variability: Glass Containers

Container Type: The late 19th and early 20th centuries saw thousands of new products introduced to the general public. Many of these items were packaged in glass containers of characteristic shape rather than with labels because many customers could not read. Some of these functionally dictated container shapes, including beer, soda pop, milk, ketchup and mustard among others, persist to the present day. In addition to functional information concerning content, container shapes can be used for dating purposes. Canning jars were first manufactured in 1810; beer was first bottled in 1873, soda pop and milk in the 1880's and mentholatum in 1889, for example.

Color: Color of glass is determined by mineral additives. The natural color of glass is a pale greenish-brown; throughout the history of glass container manufacture different additives were employed to change that natural color. The following colors can be employed to date periods of glass manufactured:

Black glass (actually a very dark green): (1815-1885); purple or amethyst: (ca. 1880-1917); aqua: (1880-1920); honey (very pale brown): (1924-ca. 1930's); dark brown (amber): (1873-present); opalescence ("sick glass"): (?-1930's); perfectly clear: (1930-present).

Closures: Variation in closures reflect many attempts to develop airtight, inexpensive yet sanitary seals for glass containers. Although hundreds of closures were experimentally produced, only a few of these proved successful and were marketed for any length of time. The most common of these closures are monitored on the Historic Artifact Data Form:

Crown cap (beer and soda pop): (1892-present); screw (shallow ¼ turn): (1919-present); cork: sheared lip: (Pre 1850's); crude lip: (1840's): smooth lip: (1860's-1913).

Additional space is provided for less common closures, such as the Deep Screw for mason jars (post 1858) or the glass ball stopper for soda pop (1870's).

Seams: The presence or absence of finish or closure seams can often date a bottle before or after the introduction of automatic bottle molds in 1903. When seams are present, technological improvements and thus dates may be monitored by observing where the seams stop. The automatic bottle machine soon replaced all other methods of commercial manufacture. Seam dating is thus a good guidline for only 19th century bottles because almost all 20th century bottles will display a continuous seam over the closure. Only the presence or absence of a seam over the closure is monitored by the form. Bottles exhibiting no seam over the closure but body seams can be relatively dated from the 1850's to 1903 by noting how far seams are either free blown (pre 1830's or molded and turned in the mold such that seams are obliterated (1860's). Bottle bases exhibiting pontil scars indicate a pre-1860 date of manufacture, while bases exhibiting ring seams indicate manufacture by automatic bottle machines (1903-present).

Reuse: Reuse of broken glass containers is noted to provide functional information about the cycling of the containers as technological material resources. The form provides space to check presence or absence of wear patterns or retouching indicative of usage. The back of the form can be employ[illegible] describe such usage in detail.

Volume: Volume is [illegible]ortant for helping to date 20th century soda pop [illegible]tties. The majority of bottled soft drinks were sold [illegible] machine until recently, and had to conform to cer[illegible]ights and measurements to correspond with mach[illegible]nsions. The 6 ounce size was introduced some ti[illegible]ter 1907; 8 and 10 ounce sizes were popularized in 1924, and 12 ounce sizes were introduced in 1934.

Labels and Embossing: Labels and embossing provide information about contents, brand names or manufacturing plants which if recorded in detail can be used to refine general dates indicated by attributes of manufa[illegible]ture. Paper labels have been used throughout the history of glass container manufacture, while silkscreened labels were introduced in the 1920's and 1930's for many products. Embossing became popular with the introduction of iron molds for bottle manufacture in the mid 19th century. Space is provided for checking the kind of labels or embossing.

Attribute Variability: Metal Containers

Information concerning kinds and dates of changes in the technology of can manufacture is often conflicting, and not well documented in general. The following summary presents some attribute variability which can be employed for dating purposes.

Container Type: Container types provide primarily functional data concerning contents, and in some cases can be used for dating. Tapered meat cans were first marketed in 1875; Log Cabin Syrup cans shaped like cabins were marketed between 1887 to the 1940's; tuna was first canned in 1907; and motor oil was first canned in the 1930's. Other products canned in characteristic shapes of containers include coffee, cigarettes, tobacco, sardines and baking powder.

Opening Procedure: Opening procedures reflect much technological change through time and often aid in dating time of manufacture or use of contents. Opening procedures fall into two categories: those which involve use of a tool, and thus leaving characteristic patterns of opening; and those which do not require a tool for opening. These are summarized briefly below.

Replaceable Lids: Replaceable lids usually indicate dry contents such as baking powder or coffee, and date in manufacture after ca. 1920.

Key-opened: Keys which wind up precut metal strips

on cans containing such products as corned beef were introduced in the 1890's.

Knife-opened: Use of knives to open cans is common throughout the history of can use, and thus provides little datable information. Patterns of knife opening can, however, suggest container contents.

Bayonet: (not on form) Bayonet type openers were introduced ca. 1858.

Twist: Twist type rotating gear openers were introduced in 1925.

"Church Key": (not on form) Punch or "church" key" openers for beverage containers were first marketed during the 1930's.

Pop-tops: Pop-top openings were introduced in the early 1960's.

Volume: Volume may be embossed or silkscreened onto cans, and provide potential information concerning dates of manufacture.

Seams: Early cans were manufactured by hand with heavy soldered seams. Machine soldered cans were manufactured beginning in 1880 and are characterized by a more sparing use of solder and more even application. The shift from soldered to double crimped unsoldered seams is not well documented, but appears to have taken place sometime ca. 1900 in most cases.

Material: Aluminum is a latecomer to the canning industry and has been used largely for beverage containers since the mid 1960's. Inside-coated or laquered cans were first used in the U.S. in 1890. Cans for dry foods such as coffee and non-food products such as paint or oil may be manufactured from tinless steel plate.

Labels: Labels, whether embossed, silkscreened or paper, are probably the best single attribute for yielding both functional and temporal information. The first offset press to print on metal was invented in 1875, using two colors at first, and up to four colors by the 1940's. Silkscreen methods for labeling cans have been employed since 1907. Paper labels are ubiquitous throughout the history of canning, while embossing seems to have been confined to the replaceable lids of early dry foods and nonfood items.

Reuse: Reuse is monitored in an attempt to document the utilization of cans as technological materials. Can reuse often involves modification of the container for utilization as a cup, strainer or cutting tool. Room is provided on the reverse side of the form for description of reuse.

Other Historic Artifacts

The reverse side of the Historic Artifact Data Form was designed to monitor in general fashion some classes of artifacts for which information has been established, with blank spaces for additional listings and comment.

Nails: Nails may be dated if the method of manufacture (hand-forged, square-cut, drawn wire) is noted.

Cartridges: Cartridge cases can often be dated if the exact notation of embossing and caliber is made.

Enamelware: Cast iron pots were first enameled in 1874, and by 1890 fabricated seamed utensil and seamless deep-drawn items were enameled. The first enamelwares (pre-1920's) were often called "Agatewares" and were usually a drab grey on grey or blue color. Around 1920, white and many bright colors became popular. Cast iron pots were made as early as 1642, tinware as early as 1720, porcelain enameled pots in 1874, stamped and cast aluminum in 1892, pyrex glass in 1915, stainless steel in 1927, chrome plate in 1933, and copper bottomed utensils (Revere Ware) in 1937.

Plastics: Some kinds of plastic items have been marketed beginning in 1872, but extensive use of plastics for commercial production of many disposable items including containers did not begin until after World War II. The following list presents beginning dates of manufacture of some plastic items.

Knobs: (1909); buttons: (1919); caps for squeeze tubes: (1920); combs: 1927); food storage containers: (1940's); dishes: (1946); squeeze bottles, and a variety of other bottles: (early 1950's).

Barbwire: Barbwire can be dated if illustrated properly.

Lumber: Approximate dates can be assigned to lumber on a regional basis if it is noted as milled, roughsawn, etc.

Other: This category is employed to record any items not otherwise accounted for on the form. A variety of items can be dated if properly described, including buttons, automobile parts, toys, etc. Tinker Toys were first manufactured in 1914, Ideal Toys (brand name) in 1902, and Mattel Toys (brand name) in 1945, for example.

Historic Artifact Data Form: Comments

The Historic Artifact Data Form proved to be an economical means of monitoring 19th and 20th century variability in the field, although a variety of specific attribute variability was encountered which could not be accommodated by the form in its present state. Nearly all specific suggestions made by the field crew concerning changes in the form were related to the need to incorporate additional attribute variability, or to modify the ordering of the data matrix to increase time efficiency in the form's use. It was apparent during the laboratory phase that a considerable amount of further research needs to be undertaken to refine the kinds of technological and morphological variability which are the best monitors of manufacturing dates. This is especially true for metal containers. In general, the present format, which involves monitoring attribute variability on a case by case basis, proved to be an efficient strategy both in field documentation and for purposes of computerization in the laboratory.

III.3 SURVEY OF COCHITI RESERVOIR: METHODOLOGY

SUMMARY

The methodology of data collection employed during survey of Cochiti Reservoir differed very little from archeological surveys now routinely conducted by the majority of institutions, with the possible exception that the survey methodology was designed from the outset to involve no artifact collection for subsequent laboratory analysis. In light of reservations concerning the analytical utility of no-collection survey policies expressed by some of our colleagues, it is felt that a brief discussion of possible problem areas is in order.

A central point of concern in most doubts about no-collection survey has been voiced by Schiffer:

> Some contract archeologists maintain that they can conduct a survey without collecting any materials from sites. It is hardly necessary to point out that only limited amounts of information can be recorded in the field, and that these kinds of information will invariably be recorded in very general, *extant* categories. I do not regard this approach—which tacitly assumes that nothing new can be learned from site survey data—as being capable of assessing the significance or research of potential of a body of archeological resources in any satisfactory way (Schiffer 1975:6).

Schiffer's objections seem to derive primarily from the feeling that archeological field survey will be severely limited in both the amount and kind of information which might be recorded about archeological resources, if artifacts are not collected for subsequent laboratory examination. This argument is implicitly based upon an unsubstantiated assumption that most kinds of artifact analysis performed in the laboratory either cannot be performed at all in the field, or cannot be performed routinely throughout the course of field survey.

It is true that some kinds of analysis cannot be efficiently pursued under field conditions given limitations of time, money and technological hardware generally available for survey projects. Extensive stereomicroscopic examination of wear pattern variability exhibited by stone tools, for example, would be difficult to undertake as routine field analysis, although not impossible with adequate (and expensive) logistical support.

The vast majority of analytical procedures employed in the laboratory to document artifact variability are *not*, however, those necessitating cumbersome hardware or controlled environmental conditions. They rather involve recognition and measurement of attributes which can be observed either megascopically or under low (ca. 10x-20x) magnification. Examples of such variability include attributes of surface treatment of ceramic vessels, or attributes of retouch modification exhibited by stone tools.

Limitations to effective documentation of such attribute variability are largely those of training, not the environment in which analysis is performed. Well trained personnel equipped with data recording formats designed to maximize efficiency in notation can rigorously document considerable diversity among kinds of information, whether in the lab or in the field.

The degree to which such information must "invariably be recorded in very general, *extant* categories" if documented in the field must be viewed in a somewhat different light, which again has nothing to do with the analytical environment.

If attribute data are defined solely to distinguish artifact taxons, and if frequency counts of those taxons serve as the sole documentation of artifact variability for use in subsequent analysis, Schiffer's objections are entirely justified no matter where the initial documentation takes place.

If, however, attribute data are defined as independent monitors of behavioral variability relevant to a set of problems, and are documented in a fashion which permits subsequent analysis to delineate structures of covariant relationships among those monitors, the argument that nothing new can be learned from such information becomes trivial.

It can be suggested, then, that the only parameter truly limiting the kinds of information concerning artifact variability which might be documented in the field is that of economical hardware transportation (such as microscopes or triple beam balance scales). In all other respects, the kind and analytical utility of data recorded during field survey need be no different from the kind and analytical utility of data recorded under laboratory conditions; both are entirely dependent upon the archeologist's capability to design an efficient structure for documenting variability relevant to a set of problems, and to train personnel who can rigorously implement that design.

Another consideration which has been raised with respect to no-collection archeological survey centers about the question, "Will information documented now be in any way relevant to future research problems?" The answer to this question is in all probability "no" given an empirical perspective over the last 100 years of anthropological research.

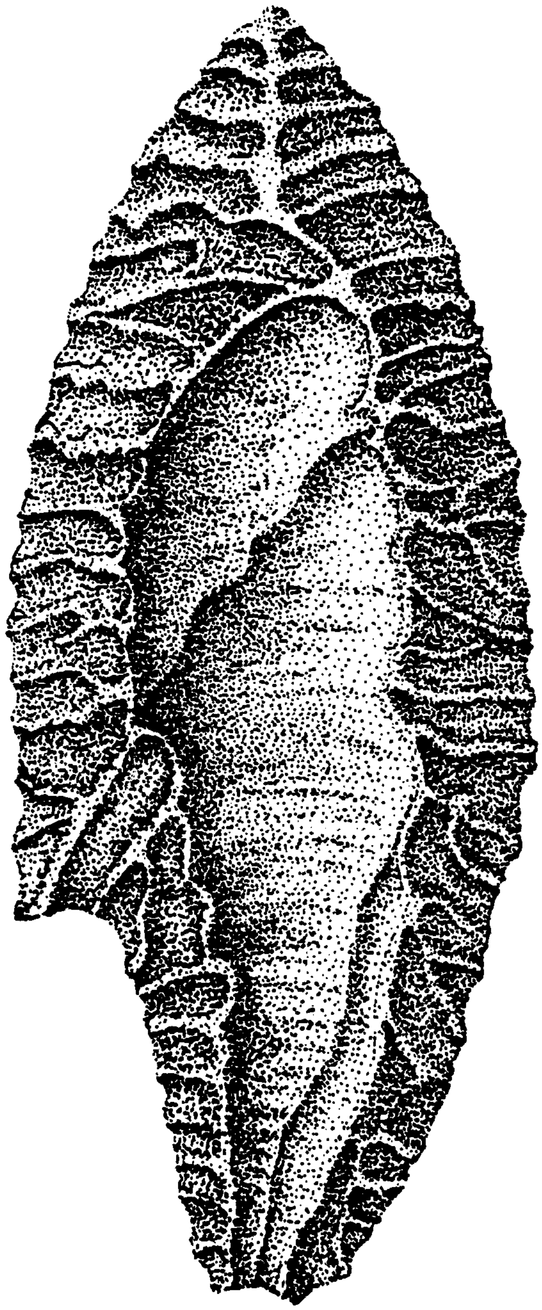
The more basic question which must be entertained is whether a repository of artifact collections from surfaces of site locations can realistically be expected to provide information relevant to future research problems as well. Field collection procedures rarely involve developing a map which documents the exact spatial locus of each artifact collected with respect to a truly permanent datum. Artifacts are instead generally collected as samples from one or more areas across the site surface. The potential analytical utility of such collections for problems substantially different from those guiding the sampling procedures employed is thus subject to considerable question.

The ultimate objectives of archeological field survey, especially those conducted for cultural resource management purposes, must also be taken into consideration in this regard. If the primary directive of such survey is to assess both the significance and research potential of a body of archeological resources, and the most ideal mitigative alternative which can be recommended is that measures be taken to preserve those resources, the potentially destructive effect artifact collection might have upon both the significance and research potential of those resources must be weighed very seriously and carefully against any generalized and nonspecific concern about the future analytical utility of the collections themselves.

In summary, it is felt that the majority of doubts

raised concerning the quality or scope of archeological research based upon survey collection of data rather than artifacts, are doubts springing from a deeply rooted appreciation of the artifact as an *objet d'art* which must be constantly available for repeated visual and tactile perception if its true meaning is to be un-ⁱerstood.

While such esthetic concerns constitute an admittedly relevant aspect of much ongoing archeological research, we would suggest that no-collection policies of field survey offer a potentially more viable solution to both our research commitments and our resource management responsibilities.



III.4
Survey of Cochiti Reservoir: Presentation of Data

JAN V. BIELLA and RICHARD C. CHAPMAN

INTRODUCTION

A total of 325 archeological sites were documented during the surveys of Cochiti Reservoir; 102 sites were located within the boundaries of the permanent pool (below 5322 ft contour) and 223 sites were located in the flood control pool (between 5322 ft and 5460 ft contours). Twenty of these sites had been documented previously (Snow 1972a; Flynn and Judge 1973; Schaafsma 1975). This chapter will review some of the variability monitored for the cultural resources documented in Cochiti Reservoir. A series of tables, which appear in this chapter, present detailed summaries of environmental, architectural and artifactual variability for each site location.

Three major periods of occupation are represented in Cochiti Reservoir: Late Archaic, 800 B.C. to A.D. 400 (Irwin-Williams 1973); Anasazi, A.D. 600 to A.D. 1600 (Wendorf 1954), and Historic, ca. A.D. 1540 to present. The majority of these site locations are either nonstructural artifactual scatters, which are frequently associated with hearth features, or small one to three room structural sites. Only a single large 200-400 room pueblo was recorded. Additional classes of sites included shelters, depressions, terraces, corrals, pens and petroglyphs.

The following discussion will briefly summarize some of the variability among site locations monitored during the surveys of Cochiti Reservoir.

SUMMARY OF ARCHEOLOGICAL VARIABILITY

Nonstructural Open Sites

Ninety nonstructural site locations with a total of 121 provenience locales were recorded during survey. These site locations were characterized by lithic or lithic and ceramic scatters; some were associated with hearth features or the by-products of hearth usage (firecracked rock). Lithic artifacts from several of these site locations suggest their deposition during the latter periods of Archaic adaptation (ca. 800 B.C. to A.D. 400) and other lithic and/or ceramic artifacts suggest a reuse of some of these site locations or deposition during one or more periods of Anasazi adaptation (primarily between A.D. 1325-1450). Although a single isolated fragment of an Agate Basin projectile point was observed during survey, no other artifacts diagnostic of PaleoIndian or Early Archaic Periods were noted.

The assignation of proveniences and site locations to one or more of these periods of adaptation was an extremely difficult problem and will be treated in greater detail in the appendix to this chapter. In general, the frequency of diagnostic artifacts for the vast majority of proveniences was so low that they could not be assigned to a temporal/cultural period. Consequently all nonstructural sites will be examined as a single unit of analysis although they reflect, in all probability, strategies of both Archaic and Anasazi Periods of adaptation.

1. Nonstructural sites with hearth features

Seventy-five of the 121 nonstructural proveniences exhibited hearths or evidence of hearth activities in the form of firecracked rock scatters. Although the majority of these were single hearth proveniences, some were characterized by as many as 10 separate hearth areas. Artifactual density ranged from 0.01 to 179.0 artifacts per sq. meter. Lithic assemblages were characterized by both by-products of tool manufacture in the form of unutilized debitage, cores and occasional hammerstones, and by-products of tool use in the form of utilized debitage, retouched debitage, occasional projectile points or biface fragments and resharpening flakes. Milling implements in the form of manos and metates occurred infrequently. Ceramic fragments were recorded for 23 of these proveniences, although only 28 proveniences exhibited more than ten sherd fragments each. The majority of ceramics dated to P-IV phase of manufacture.

2. Nonstructural sites without hearth features

Forty-six proveniences were characterized solely by the presence of lithic or lithic and ceramic debris. These varied in size from 12 to 12,500 sq. meters in extent. Artifactual density ranged from 0.05 to 42.0 artifacts per sq. meter with the majority of proveniences between 0.05 and 1.5 artifacts per sq. meter, a slightly higher density than exhibited by proveniences with hearths. Samples of stone artifacts indicated both manufacturing and usage activities for all but a few proveniences. Milling implements occurred occasionally. Twelve proveniences exhibited ceramics. The majority of these had between one and five sherd fragments which dated to P-IV phase of manufacture.

Nonstructural sites were not distributed evenly throughout the reservoir area. They appeared to cluster at the mouth of White Rock Canyon on the east side of the Rio Grande and also at the mouths of tributaries which drain directly into the Rio Grande in the canyon. There were, however, no apparent differences in distribution between sites with or without hearth features or with or without ceramic assemblages.

Anasazi Site Locations

A total of 228 proveniences from 187 site locations were assigned to the Anasazi Period (ca. A.D. 600-1600). Nine of these were nonstructural open site locations and have been included in the previous discussion. The remaining proveniences were characterized by architectural remains including room and rubble features, depressions, terraces and check dams.

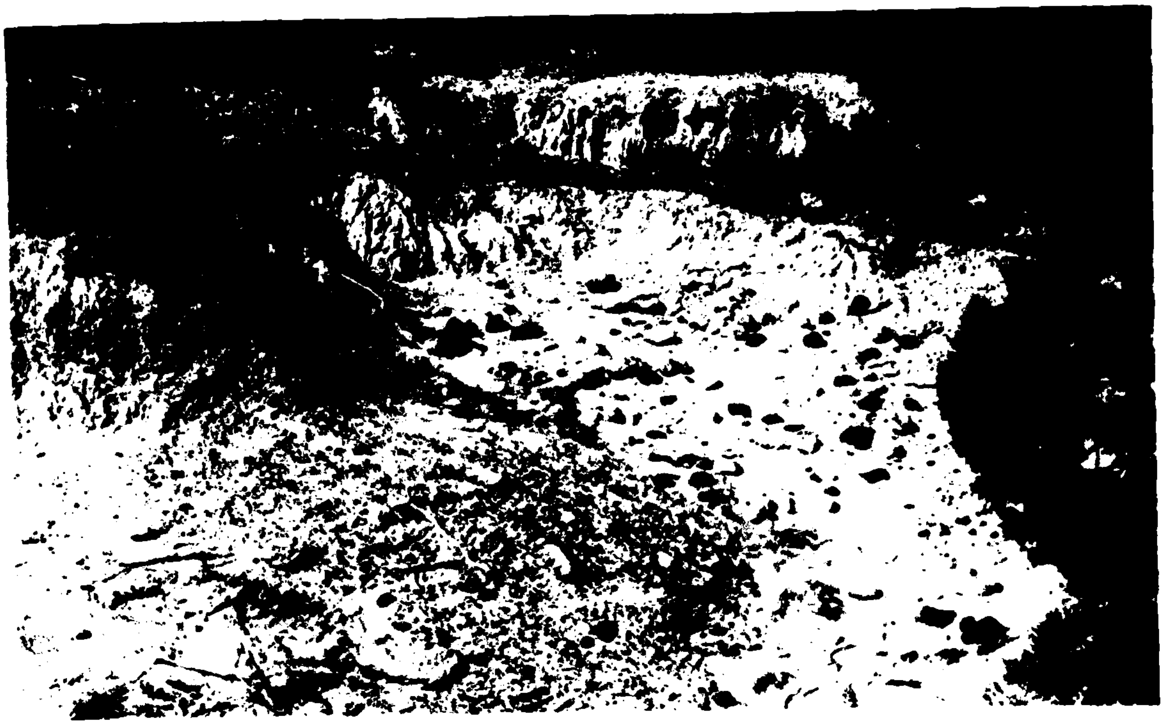


FIG. III.4.1 Firecracked rock-lithic scatter (LA 12448, Prov. 1)

FIG. III.4.2 Lithic scatter with lithic artifacts high-lighted by pin flags (LA 12442)

III.4 SURVEY OF COCHITI RESERVOIR: DATA PRESENTATION

1. **Early Developmental** (BM-III and P-I)
ca. A.D. 600-900

Although no sites located during survey could be positively assigned to the Early Developmental Period defined by Wendorf (1954), 17 proveniences from 12 site locations which were characterized by one or two depressions (pithouses?) may date to this phase. These proveniences generally lacked lithic and ceramic artifactual debris and only three had associated surface structures. Although sites with depression features occur in the Middle Rio Grande from BM-III through P-IV phases in the form of either pithouses or kivas, the paucity of artifactual debris suggests that they most probably date to the earlier phases. They were assigned, however, to the Anasazi (?) Period. With the exception of one six-provenience site in upper White Rock Canyon, the remaining proveniences are situated on the south bank of the Santa Fe River.

2. **Late Developmental** (P-II), ca. A.D. 900-1200

Although P-II sites have been located in the vicinity of the reservoir (Snow 1972a), none were documented during survey.

3. **Coalition** (P-III), ca. A.D. 1200-1325

A total of eleven single component P-III proveniences were recorded during survey. Four were one room proveniences; five had between two and four rooms; one was a possible isolated shrine or kiva, and one was an estimated 12 to 17 room pueblo. None were associated with terraces. Because of the low frequency of datable ceramics recorded during survey (the number of sherds per provenience location ranged from one to 32), only two of the eleven proveniences are dated with any security. There is no apparent patterning to the distribution of P-III proveniences; they occur infrequently throughout the reservoir area.

Lithic artifactual density ranged from 0.04 to 4.67 artifacts per sq. meter. Although the range in density was significantly lower than for nonstructural site locations, the average density for most P-III proveniences was higher (between 1.0 and 2.0). Lithic assemblages were characterized by both tool use and manufacture. Only one provenience exhibited evidence of milling activities in the form of an indeterminant fragment of ground stone.

The ceramic assemblages were characterized by a greater frequency of painted ware vessels than utility ware vessels. Bowl fragments also occurred more frequently than olla or jar fragments.

4. **Classic** (P-IV), ca. A.D. 1325-1600(?)

Eighty-six single component P-IV proveniences were documented during survey. Forty were one room proveniences; 19 were two room proveniences; three exhibited three rooms; one was a shelter; one 200-400 room pueblo was documented, and the number of rooms for three proveniences could not be determined. Eight proveniences were nonstructural lithc and ceramic scatters; another eight were terraces; and three exhibited four or more room structures.

Lithic artifactual density ranged from 0.05 to 15.8 artifacts per sq. meter. In general the densities were analagous to those of nonstructural site locations except for the cluster of proveniences below LA 3137 which exhibited an average density of over 3.5 artifacts per sq. meter. Lithic assemblages were characterized by both tool use and manufacture with little evidence of milling activities. Only one mano and nine metate fragments were recorded.

As for P-III proveniences, the P-IV ceramic assemblages were characterized by a greater frequency of painted ware vessels than utility ware vessels. For many proveniences, no utility ware sherds were documented. Painted ware bowl fragments generally outnumbered olla or jar sherds.

5. **Multicomponent P-III/P-IV Proveniences**

Thirteen multicomponent P-III/P-IV proveniences were documented. These ranged from one to six rooms in extent. The majority exhibited between two and four rooms each. Two proveniences were characterized by a depression and associated surface rooms. In general, these proveniences were slightly larger than single component P-III or P-IV sites.

Lithic artifactual density ranged from 0.04 to 10.5 artifacts per sq. meter. The majority of multicomponent proveniences exhibited less than 1.0 artifacts per sq. meter. Evidence of tool usage and manufacture is similar to single component P-III or P-IV site locations with a slightly higher frequency of milling implements. The number of ceramics ranged from five to 40 sh[illegible]th the exception of one provenience, the number of painted ware vessels outnumbered the number of utility ware vessels. Painted ware bowl sherds occurred more frequently than olla or jar fragments.

6. **Anasazi Period, Phase Unknown**

In absence of diagnostic artifacts, 83 site locations with 110 proveniences were tentatively assigned to the Anasazi Period based upon architectural similarities with datable Anasazi site locations, both from survey and published materials (Wendorf 1954; Snow 1972a). These proveniences could not be dated to a specific phase. They included 43 single room proveniences; eight two-room proveniences; one provenience of one to three rooms; three proveniences characterized by rubble with an indeterminate number of rooms, although probably between one and three rooms; 16 proveniences which exhibited depressions (pithouses?) (these may date to BM-III or P-I and have been discussed above); 34 proveniences characterized by terraces; four proveniences which exhibited check dams and one provenience characterized by a petroglyph. A few proveniences lack lithic assemblages. The character of the remaining assemblages similar to datable P-III and P-IV proveniences. They exhibit evidence of both tool use and manufacture, and fragments of ground stone occur infrequently. Undatable ceramic fragments occurred on only three proveniences.

Historic Sites

A total of 128 proveniences from 85 site locations dated to the Historic Period, post-A.D. 1540. These sites exhibited a considerable diversity in manifestation and ranged from modern campsites to structural complexes of up to nine rooms, and included isolated corrals, extensive networks of low walls and isolated trash areas. Historic Period sites encompassed more discrete spatial

FIG. III.4.3 Typical Anasazi(?) P-IV (?) single masonry room (LA 5013)

FIG. III.4.4 Anasazi P-IV rubble mound (LA 12461, Prov. 2)

areas and were often recorded as multiprovenience site locations.

1. Colonization Phase (A.D. 1598-1680)

Two site locations may date to the Colonial phase. One was a single provenience artifactual scatter with ceramics which were probably manufactured between A.D. 1600-1650. The other site location consisted of a single masonry room with two sherd fragments.

2. Spanish Colonial Phase (A.D. 1692-1821)

A total of 23 proveniences of 18 site locations dated to the 17th or 18th centuries. Eleven were single room proveniences; seven were two-room proveniences; one provenience exhibited between one and four rooms, and one provenience was characterized by seven to nine structures along a ridge. Additional proveniences exhibited terraces, isolated lithic and ceramic scatters, and a trail with cairns. A network of walls tied a series of these proveniences together. These sites were distributed solely within White Rock Canyon on both sides of the river with the majority being situated below Capulin Canyon.

3. Mexican Phase (A.D. 1821-1846)

Because of the paucity of known diagnostic artifactual debris which may be associated with the Mexican phase, no site locations could definitely assigned to this phase. A number of Historic Period sites or site of unknown period may date to this phase.

4. Territorial Phase (A.D. 1846-1912) and Statehood Phase (A.D. 1912 to present)

A total of 52 proveniences have been assigned to either the Territorial or Statehood phases. Thirty-one proveniences date to the late 19th or early 20th centuries and twenty-one post-date World War Two. These latter site locations are predominantly modern campsites exhibiting one or two hearth features while the former are predominantly characterized by isolated rooms and/or corral structures. A few proveniences are characterized solely by scatters of historic trash. One of these proveniences may have been a "dump" area for the labor camp at Boom located at the mouth of White Rock Canyon.

5. Historic Period, Phase Unknown

A total of 30 proveniences from 31 site locations were assigned to the Historic Period based upon architectural similarity with datable Historic Period sites. These proveniences usually exhibited one or two room structures with associated corrals, ovens or petroglyphs. As indicated above, some of these proveniences may date to the Mexican Phase, although morphologically they could date to any Historic phase.

Unknown Period Sties

A total of 49 proveniences from 36 site locations could not be assigned to a temporal period. The majority of these proveniences were one and two room isolated structures or remnant walls which might have been part of an enclosed structure. Several proveniences were characterized by small architectural features which might have been pens or storage cists. Additional proveniences were characterized solely by petroglyphs. One provenience exhibited 35 distinct piles of rock of unknown purpose. These proveniences lacked any associated artifactual debris.

Petroglyphs

Numerous isolated petroglyphs and petroglyph panels were recorded during both surveys. Illustrations of some of the petroglyphs have been included in this volume. Since a separate study of the rock art of Cochiti Reservoir has been published by Schaafsma (1975), the interested reader is referred to her excellent work.

DESCRIPTION OF CULTURAL RESOURCES IN COCHITI RESERVOIR

Some of the variability monitored during the surveys of Cochiti Reservoir are presented in a series of tables which follow. Several factors have conditioned the organization of information presented in these tables and these will be discussed below.

1. Units of Observation

For purposes of summarizing variability among the cultural resources documented during the surveys of Cochiti Reservoir, proveniences rather than site locations were used as the basic units of observation. In general, proveniences defined during survey reflected discrete spatial locales within a site location. These locales might or might not reflect different temporal components or differences in the character of activities performed, although they were defined such that differences in contemporary or usage might be isolated. During the course of the surveys, a particular manifestation, for example a site comprised of a single hearth and a low density artifactual scatter might be defined as a single provenience site or a two provenience site. Consequently for analytical purposes specific proveniences might not be exact equivalent units of observation. It was felt, however, that they represented a more rigorous unit for analysis than the site locations and hence have been employed in the tables which summarize the survey data.

2. Assignation of Temporal/Cultural Affiliation

In attempting to examine human behavior from the regional frame of reference suggested in the research perspective (Section I), it is critical to be able to define contemporaneous proveniences or site locations. Surveyed sites are generally assigned temporal and/or cultural affiliation based upon the presence of diagnostic artifacts, distinctive projectile points or ceramic types, which have been dated through absolute or relative dating techniques. While sufficient work has been conducted in the Middle Rio Grande to establish relative chronologies based upon such diagnostic markers, sites recorded during the surveys of Cochiti Reservoir rarely exhibited many datable artifacts. For example, only a few sites were characterized by as many as 30 or 40 sherds: the vast majority which exhibited ceramics had only between one and five sherds each. Similarly, few diagnostic projectile points were deposited on the sites in the survey area. Consequently the majority of sites documented during the surveys were assigned to a temporal period or phase tentatively. A specific set of criteria were used, however, to make such assignations and these will be discussed below.

A provenience or site might be assigned to either a period or a phase. Periods were defined as temporal units

FIG. III.4.6 Single piston engine (LA 12453), late 19th/early 20th century

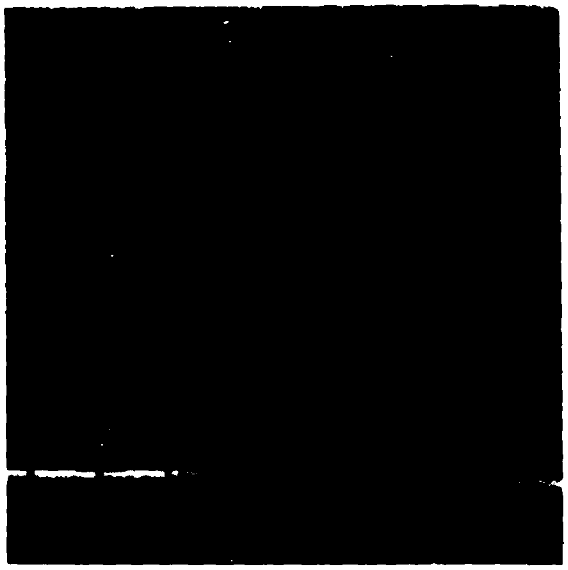


FIG. III.4.5 Modern hearth

FIG. III.4.8 Brush and masonry structure (LA 13306, Prov. 1), early 20th century

FIG. III.4.7 Juniper and barbed wire corral (LA 12458)

which reflect gross differences in adaptive strategy. Periods defined for the survey area were of two classes, datable and nondatable. The datable periods were Archaic (pre-A.D. 600), Anasazi (A.D. 600 to ca. 1600) and Historic (post-A.D. 1540). The nondatable periods were "Lithic Unknown" for nonstructural sites characterized by artifactual scatters and/or hearth activities, and "Unknown" for structural sites lacking datable artifactual remains. If sufficient datable artifactual debris were recorded, a site or provenience would be assigned to a phase. Phases are shorter temporal units within specific periods. These include for the Anasazi Period P-I, P-II, P-III or P-IV; phases defined for the Historic Period include Spanish Colonial, Mexican, Territorial, etc.

Nonstructural site or provenience locations (those characterized by hearth features and lithic and/or ceramic scatters), were assigned to the Archaic, Anasazi or Historic Periods if they exhibited more than five datable items (diagnostic projectile points, sherds, etc.). For example, if a provenience exhibited six sherds manufactured during a single period (Anasazi or Historic) it was assigned to that period. If, however, it exhibited less than five datable items, it was assigned to the Lithic Unknown Period. Similarly, structural site or provenience locations were assigned to a specific period if they exhibited more than five items datable to that period. If they exhibited five or less datable items, for example, four sherds manufactured during the Anasazi Period, it would be assigned to Anasazi (?). Thus a question mark following a period denotes a tentative assignment of the provenience or site to a particular period. If a structural site or provenience lacked any datable items, it was assigned to the Unknown Period. Some structural sites which lacked diagnostic artifacts might be assigned to Anasazi (?) Period or Historic (?) Period based upon constructional detail of an architectural feature or the amount of reduction of a feature. Anasazi (?) was also assigned to two additional classes of sites which lacked datable debris: sites characterized by either terraces or other water control manifestations, or depressions (pithouses or kivas).

Phases within a specific period were assigned to both structural and nonstructural site or provenience locations in a similar fashion. That is, a provenience or site location had to exhibit more than five items datable to a specific phase to be assigned to that phase. For example, if a provenience exhibited three P-III sherds and seven P-IV sherds, it would be assigned to the Anasazi Period and P-III(?)/P-IV Phases.

3. Organization of Tables

Since the data recovery techniques differed slightly between the surveys of the permanent and flood control pools of Cochiti Reservoir, two sets of tables have been prepared, one for each survey. Each set of tables summarizes similar kinds of information and whenever possible the two are identical.

Tables III.4.1 and III.4.2 review some environmental and locational information for the permanent pool and flood control pool sites respectively. These are the only tables which are organized by site rather than provenience. Categories of information presented include: site number (Laboratory of Anthropology number); site size in square meters; number of proveniences recorded; cultural period and phase for the site as a whole; elevation; ecological community on and around the site (after Drager and Loose, this volume); drainage basin (after Brakenridge, this volume); physiographic situation; exposure; slope; whether the site is located on the east or west bank of the Rio Grande, and distance to the Rio Grande. For the permanent pool survey, exposure was recorded in terms of the eight cardinal directions (north, northwest, etc.). For the flood control pool survey, exposure was recorded in degrees measured on a Brunton compass. Slope was only recorded for the flood control pool survey. Distance to the Rio Grande was measured on 7.5 minute USGS quadrangles.

Tables III.4.3 and III.4.4 present brief descriptions of each site by provenience. The information summarized included: provenience size; period and phase, frequency, kind and description of any architectural features; presence of artifactual debris (lithics, ceramics, historic debris) and the presence of petroglyphs or pictographs.

Tables III.4.5 and III.4.6 present descriptive details for nonhearth features including kind of feature (room, corral, tent base, depression, etc.); shape: interior dimensions; height and constructional material.

Tables III.4.7 and III.4.8 summarize ceramic assemblage variability for each provenience. These include: total number of sherds; sample area size; density per square meter; ceramic type; and vessel form.

Table III.4.9 summarizes material variability and reduction variability among lithic assemblages monitored for proveniences from site locations surveyed within the permanent pool. Variability among lithic materials is summarized as counts by generic material types. Variability in reduction is summarized as counts of noncortical debitage, cortical debitage and cores by generic material types, and as a count of hammerstones for the entire provenience.

Table III.4.10 summarizes information concerning stone tool utilization among proveniences by site location. Included in the table is sample area size in square meters, total lithic artifacts, number of artifacts per square meter, and the percent of those artifacts utilized as tools when monitored. Frequency counts of artifact and tool taxons are presented for all artifacts monitored within provenience locales. It should be noted that frequencies of utilized debitage represent a count of those pieces of unretouched and retouched debitage which exhibited utilization, and thus are not an additive category.

Tables III.4.11-13 summarize lithic artifact variability for proveniences within site locations monitored during survey of the flood control pool. Table III.4.11 summarizes generic material type variability by frequency counts of artifacts manufactured from materials with known sources within the study area, materials with known sources outside the study area, and materials for which no source location has been documented. It should be noted that lithic artifacts were originally monitored according to specific taxons discussed in Warren (this volume).

Table III.4.12 summarized information concerning stone tool utilization by provenience among site locations. Included in this table is sample area size in square meters, total lithic artifacts, the number of artifacts per square meter, and the percentage of all lithic artifacts utilized as tools. Frequency counts of artifact and tool taxons are presented for all lithic artifacts monitored within

provenience locales. Because evidence of utilization was routinely monitored for all pieces of debitage during the permanent pool survey, frequency counts of utilized unretouched debitage constitute an additive taxon in the table.

Table III.4.13 summarizes information concerning reduction variability among proveniences. This variability is summarized as frequency counts of debitage which exhibit cortex and debitage without cortex; frequencies of angular debris with cortex and without cortex, and frequency of cores for each generic material type (e.g. obsidian, basalt, etc.). The total number of hammerstones is presented for each provenience as well.

Tables III.4.14 and III.4.15 summarize historic artifactual debris, including the kind of items monitored, *their frequency and their date of manufacture.*

Table III.4.16 summarizes variability for isolated occurrences, including physiographic situation, vegetation, cultural period, description of features and artifactual debris.

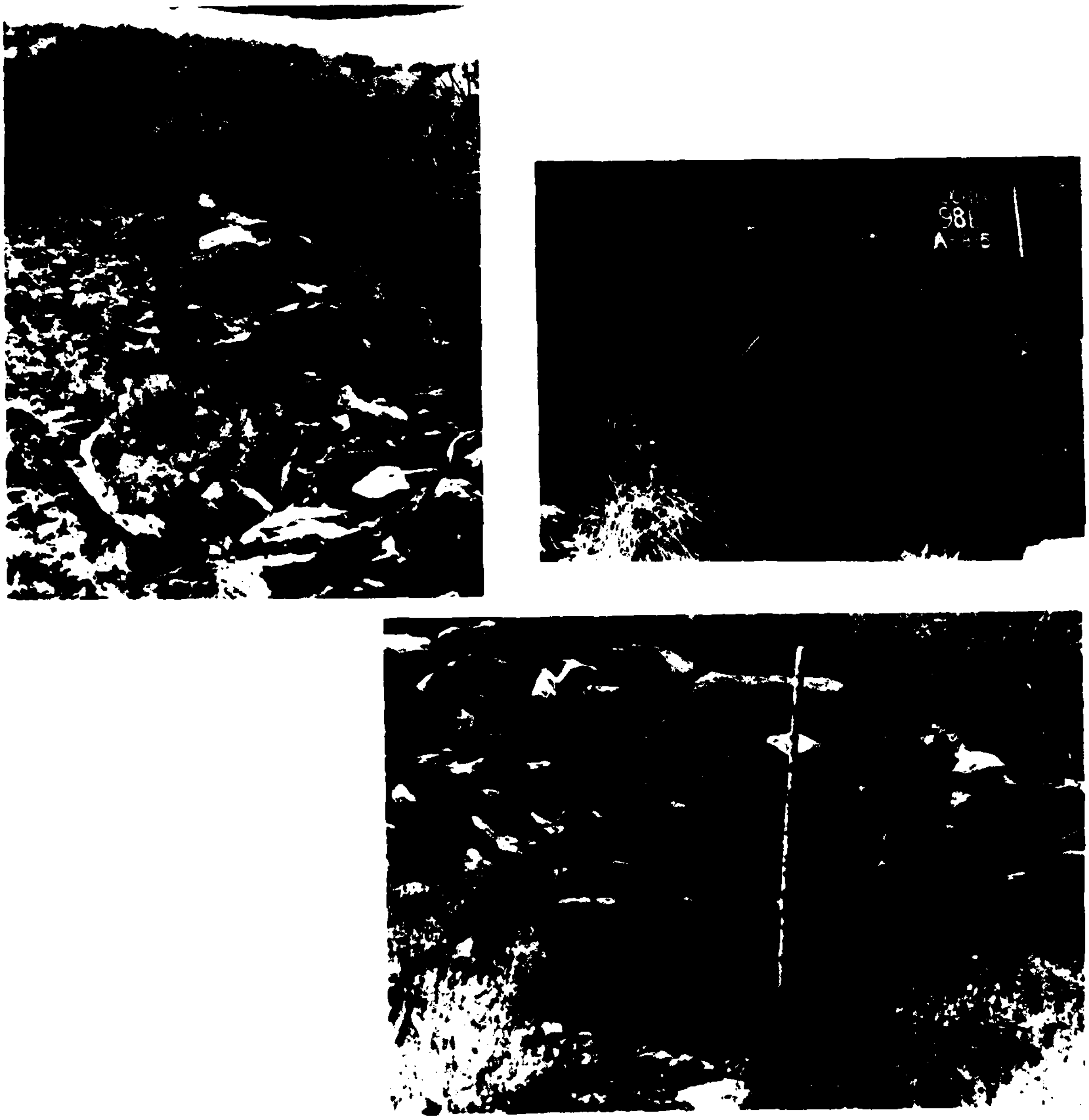


FIG III.4.9 Masonry building materials are abundant in White Rock Canyon and have been incorporated into a variety of walled features. Some of the constructional variability monitored during survey is illustrated above.

TABLE III.4.1

ENVIRONMENTAL AND LOCATIONAL DATA--PERMANENT POOL SURVEY

SITE NUMBER	SITE SIZE (m^2)	PROV.	PERIOD	ELEV. (ft)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	EXPOSURE	SIDE†	DIST.††
LA 5011	408	1	Anasazi(?)	5350	Upper Sonoran Juniper	RG/WRC **	base of talus; sand dune	east	west	140
LA 5012	504	1	Anasazi	5350	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats; base of talus	east	west	120
LA 5013*	28	1	Anasazi(?)	5290	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southwest	west	60
LA 5014*	142	1	Anasazi	5320	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	east	west	80
LA 5015	30	1	Anasazi(?)	5320	Upper Sonoran Juniper	RG/WRC	talus and bench interface	south	west	40
LA 9138*	6532	6	Historic	5300	Upper Sonoran Juniper	RG/WRC	gravel terrace	southwest	west	80
LA 9139*	200	1	Historic	5280	Upper Sonoran Juniper	RG below WRC ***	gravel terrace	southwest	east	200
LA 10110*	100	6	Historic	5280	Upper Sonoran Juniper	RG/WRC	talus and bench interface	southeast	west	40
LA 10111*	3000	6	Historic	5280	Upper Sonoran Juniper	RG/WRC	river bottom; base of talus	southeast	west	20
LA 12160	20	1	Historic(?)	5300	Upper Sonoran Juniper	RG/WRC	base of talus	south	west	40
LA 12161*	180	1	Anasazi(?)/Historic	5320	Upper Sonoran Juniper	RG/WRC	alluvial bench; base of talus	south	west	120
LA 12434	1625	1	Historic	5290	Upper Sonoran Juniper	RG below WRC	alluvial bench	west	east	140
LA 12435	252	1	Historic	5290	Upper Sonoran Juniper	RG below WRC	gravel terrace	southwest	east	160
LA 12436	3750	1	Lithic Unknown	5320	Upper Sonoran Juniper	RG below WRC	gravel terrace	southwest	east	360
LA 12437	80	1	Historic	5280	Upper Sonoran Juniper	RG below WRC	alluvial bench	southwest	east	200
LA 12438*	150	1	Anasazi	5280	Upper Sonoran Juniper	RG/WRC	alluvial bench	southwest	east	180
LA 12439	2600	1	Lithic Unknown	5320	Upper Sonoran Juniper	RG/WRC	alluvial bench	southwest	east	200
LA 12440	1350	1	Anasazi	5300	Upper Sonoran Juniper	RG/WRC	gravel terrace	west	east	200
LA 12441	50	1	Unknown	5250	Upper Sonoran Juniper	RG/WRC	terrace	west	east	20
LA 12442*	2805	1	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	alluvial bench	southwest	east	60

TABLE III.4.1(con't)

SITE NUMBER	SITE SIZE (m^2)	PROV.	PERIOD	ELEV. (ft)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	EXPOSURE	SIDE	DIST.
LA 12443*	348	1	Anasazi	5305	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	west	east	160
LA 12444*	2475	1	Lithic Unknown	5295	Upper Sonoran Juniper	RG/WRC	sand dune	north	east	180
LA 12445	731	1	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southwest	east	140
LA 12446	144	1	Lithic Unknown	5305	Upper Sonoran Juniper	RG/WRC	terrace	north	east	60
LA 12447*	800	2	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	alluvial bench	northeast	east	20
LA 12448*	1800	3	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	alluvial bench	northwest	east	10
LA 12449*	800	1	Historic	5300	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	west	east	40
LA 12450	25	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	base of talus	southwest	east	20
LA 12451	20	1	Anasazi(?)	5300	Upper Sonoran Juniper	RG/WRC	alluvial bench; basalt talus	northwest	east	40
LA 12452	468	2	Anasazi/Historic	5290	Upper Sonoran Juniper	RG/WRC	basalt talus	south	east	20
LA 12453	96	1	Historic	5300	Upper Sonoran Juniper	RG/WRC	terrace	southwest	east	20
LA 12454*	975	2	Anasazi/Historic	5290	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southwest	east	120
LA 12455	532	2	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southwest	east	60
LA 12456*	1575	4	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	sand dune	southwest	east	20
LA 12457	16	2	Unknown	5300	Upper Sonoran Juniper	RG/WRC	basalt talus	west	east	10
LA 12458	1200	1	Historic	5300	Upper Sonoran Juniper	RG/WRC	basalt talus	southwest	east	20
LA 12459	300	2	Lithic Unknown/ Historic	5320	Upper Sonoran Juniper	RG/WRC	basalt talus	west	east	20
LA 12460	7000	5	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	alluvial bench	west	east	40
LA 12461	15000	3	Anasazi(?)	5300	Upper Sonoran Juniper	RG/WRC	river bottom	northwest	east	60
LA 12462	400	1	Anasazi(?)	5300	Upper Sonoran Juniper	RG/WRC	alluvial bench	northwest	east	60
LA 12463*	1200	1	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	sand dune	south	east	40
LA 12464	2	1	Lithic Unknown/ Unknown	5300	Upper Sonoran Juniper	RG/WRC	base of talus	southwest	east	80

TABLE III.4.1(con't)

SITE NUMBER	SITE SIZE (m^2)	PROV.	PERIOD	ELEV. (ft)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	EXPOSURE	SIDE	DIST.
LA 12465	6750	9	Historic(?)	5275	Upper Sonoran Juniper	RG/WRC	base of talus	southwest	east	40
LA 12466	800	3	Historic(?)	5300	Upper Sonoran Juniper	Basin No. 6	basalt talus	south	east	80
LA 12467	800	2	Historic(?)	5300	Upper Sonoran Juniper	Basin No. 4	basalt talus	southwest	east	100
LA 12468*	800	2	Lithic Unknown	5270	Upper Sonoran Juniper	Basin No. 3	alluvial bench	northwest	east	20
LA 12469	50	1	Anasazi(?)/Historic(?)	5290	Upper Sonoran Juniper	Basin No. 3	base of talus	southwest	east	120
LA 12470	25	1	Anasazi(?)	5290	Upper Sonoran Juniper	Basin No. 3	base of talus	southwest	east	140
LA 12471	100	1	Historic(?)	5290	Upper Sonoran Juniper	Basin No. 3	talus and bench interface	west	east	120
LA 12472	1625	7	Historic	5320	Upper Sonoran Juniper	RG/WRC	terrace;base of talus	east	west	40
LA 12473	4	1	Historic	5290	Upper Sonoran Juniper	RG/WRC	sand dune	east	west	20
LA 12474	375	1	Historic	5310	Upper Sonoran Juniper	Bland	sand dune; terrace	east	west	40
LA 12475	4	1	Historic	5305	Upper Sonoran Juniper	RG/WRC	sand dune	east	west	20
LA 12476	30	1	Historic	5305	Upper Sonoran Juniper	Sanchez	sand dune	northeast	west	40
LA 12477	340	3	Historic	5305	Upper Sonoran Juniper	RG/WRC	sand dune	southeast	west	100
LA 12478	126	1	Lithic Unknown	5320	Upper Sonoran Juniper	RG/WRC	basalt talus	southeast	west	80
LA 12479	400	1	Lithic Unknown	5310	Upper Sonoran Juniper	RG/WRC	sand dune	east	west	80
LA 12480	36	1	Anasazi(?)	5310	Upper Sonoran Juniper	RG/WRC	base of talus	southeast	west	100
LA 12481	1800	3	Lithic Unknown	5300	Upper Sonoran Juniper	Sanchez	base of talus	east	west	60
LA 12482	1150	1	Anasazi	5320	Upper Sonoran Juniper	RG/WRC	base of talus	east	west	120
LA 12483*	230	1	Anasazi	5280	Upper Sonoran Juniper	RG/WRC	sand dune	southeast	west	20
LA 12484	25	1	Historic	5285	Upper Sonoran Juniper	RG/WRC	sand dune	southeast	west	20
LA 12485	300	2	Historic/Unknown	5330	Upper Sonoran Juniper	RG/WRC	base of talus	southwest	west	100
LA 12486*	130	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	sand dune	south	west	40
LA 12487	18	1	Historic	5300	Upper Sonoran Juniper	RG/WRC	river bottom	south	west	10
LA 12488	90	1	Historic	5300	Upper Sonoran Juniper	RG/WRC	sand dune	south	west	220
LA 12489	60	2	Historic	5320	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southeast	west	120
LA 12490	98	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	alluvial bench	southeast	west	40

TABLE III.4.1(con't)

SITE NUMBER	SITE SIZE (m^2)	PROV.	PERIOD	ELEV. (ft)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	EXPOSURE	SIDE	DIST.
LA 12491	36	2	Lithic Unknown/ Unknown	5320	Upper Sonoran Juniper	RG/WRC	base of talus; alluvial bench	south	west	140
LA 12492	28	1	Unknown	5320	Upper Sonoran Juniper	RG/WRC	base of talus	south	west	180
LA 12493	9	1	Historic	5280	Upper Sonoran Juniper	RG/WRC	river bottom	south	west	40
LA 12494*	1248	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	sand dune	southwest	west	100
LA 12495*	150	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	sand dune	southwest	west	100
LA 12496*	1800	1	Lithic Unknown	5320	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	southwest	west	100
LA 12497	12	1	Unknown	5300	Upper Sonoran Juniper	RG/WRC	base of talus; alluvial bench	south	west	40
LA 12498	25	1	Unknown	5325	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	south	west	20
LA 12499	2400	2	Lithic Unknown	5320	Upper Sonoran Juniper	RG/WRC	basalt talus and *bench interface*	southeast	west	60
LA 12500	3500	2	Historic	5320	Upper Sonoran Juniper	RG/WRC	base of talus	southeast	west	60
LA 12501	9	1	Unknown	5320	Upper Sonoran Juniper	RG/WRC	base of talus	southeast	west	40
LA 12502	1750	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG/WRC	alluvial bench	south	west	20
LA 12503	200	1	Lithic Unknown	5290	Upper Sonoran Juniper	RG/WRC	base of talus	northeast	west	80
LA 12504	1000	1	Historic	5290	Upper Sonoran Juniper	RG/WRC	base of talus; alluvial bench	north	west	80
LA 12505	25	1	Historic(?)	5290	Upper Sonoran Juniper	RG/WRC	base of talus	northeast	west	80
LA 12506	1000	1	Historic(?)	5290	Upper Sonoran Juniper	RG/WRC	base of talus	northeast	west	80
LA 12507*	15	1	Historic (?)	5290	Upper Sonoran Juniper	RG/WRC	alluvial bench	north	west	20
LA 12508	900	1	Historic	5310	Upper Sonoran Juniper	RG/WRC	basalt talus	no information	west	20
LA 12509	140	2	Anasazi(?)/Unknown	5320	Upper Sonoran Juniper	RG/WRC	base of talus; alluvial bench	east	west	80
LA 12511*	300	1	Anasazi	5320	Upper Sonoran Juniper	RG/WRC	base of talus	east	west	80
LA 12512*	250	1	Anasazi	5300	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	east	west	60
LA 12513	20	1	Anasazi(?)	5275	Upper Sonoran Juniper	RG/WRC	base of talus	southeast	west	40
LA 12514	900	2	Anasazi	5280	Upper Sonoran Juniper	RG/WRC	base of talus	northeast	west	60

TABLE III.4.1(con't)

SITE NUMBER	SITE SIZE (m^2)	PROV.	PERIOD	ELEV. (ft)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	EXPOSURE	SIDE	DIST.
LA 12516	36	1	Unknown	5320	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	open	west	40
LA 12517*	49	4	Lithic Unknown/ Anasazi(?)	5320	Upper Sonoran Juniper	RG/WRC	basalt ridge	open	west	40
LA 12518*	49	1	Anasazi(?)	5305	Upper Sonoran Juniper	RG/WRC	base of talus	southeast	west	120
LA 12519*	64	1	Anasazi(?)	5305	Upper Sonoran Juniper	RG/WRC	talus and bench interface	northwest	west	60
LA 12520	64	1	Anasazi(?)	5310	Upper Sonoran Juniper	RG/WRC	gravel	east	west	140
LA 12521	1800	2	Lithic Unknown	5285	Upper Sonoran Juniper	RG/WRC	sand dune	east	west	80
LA 12522*	300	1	Anasazi	5285	Upper Sonoran Juniper	RG/WRC	knoll	east	west	100
LA 12523	100	1	Historic	5290	Upper Sonoran Juniper	RG/WRC	basalt talus	northeast	west	280
LA 12524	750	1	Historic(?)	5320	Upper Sonoran Juniper	RG/WRC	basalt talus	northeast	west	100
LA 12525	875	1	Historic(?)	5280	Upper Sonoran Juniper	RG/WRC	terrace; basalt talus	northeast	west	40

KEY:

* excavated or tested

** RG/WRC = Rio Grande drainage within White Rock Canyon

*** RG below WRC = Rio Grande below mouth of White Rock Canyon

† side of Rio Grande

†† distance to Rio Grande, in meters, estimated from 7.5 minute USGS topographic map

TABLE III.4.2

ENVIRONMENTAL AND LOCATIONAL DATA
FLOOD CONTROL POOL SURVEY

SITE NUMBER	SITE SIZE	P.†	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	% SLOPE	EXPOS	SIDE ††	DIST. †††
LA 5017	150	1	Historic(?)	5340	Upper Sonoran Juniper	Capulin	flood plain	5	140	west	120
LA 10114	1600	2	Anasazi(?)	5360	Upper Sonoran Juniper	RG/WRC	talus and bench interface	18	150	west	180
LA 11591	21,000	4	Lithic Unknown	5425	Upper Sonoran Juniper	*Basin No. 2*	*mesa top*	0-18	268	east	160
LA 11592	40,000	2	Lithic Unknown	5425	Upper Sonoran Juniper	RG/WRC	gravel ridge top	n.d.	n.d.	east	540
LA 12158	3500	1	Anasazi	5360	Upper Sonoran Juniper	RG/WRC	talus and bench interface	14	110	west	160
LA 12162	1400	1	Anasazi/Historic	5330	Upper Sonoran Juniper Arid	RG/WRC	bench	4	145	west	120
LA 12163	6000	4	Lithic Unknown/Anasazi	5420	Upper Sonoran Arid	RG/WRC	basalt talus	0	155	west	200
LA 12172	36	1	Anasazi(?)	5430	Upper Sonoran Juniper	Medio	terrace	9	270	west	680
LA 12510	10	1	Anasazi(?)	5455	Upper Sonoran Juniper Grassland	RG/WRC	upper slope of axial bench	40	120	west	60
LA 12579	2400	1	Anasazi	5460	Upper Sonoran Pinyon	RG/WRC	bench above river	5	290	east	140
LA 12893	2600	3	Lithic Unknown	5320	Upper Sonoran Juniper	Santa Cruz	gravel terrace	19	250	east	800
LA 13010	240	1	Lithic Unknown	5385	Upper Sonoran Juniper	Santa Cruz	bench	12	355	east	1440
LA 13011	4000	1	Historic	5390	Upper Sonoran Juniper	Santa Cruz	terrace	7	270	east	1880
LA 13012	1550	1	Anasazi	5320	Upper Sonoran Juniper	RG below WRC	sand dune, bench	0	open	east	260
LA 13014	1800	2	Anasazi	5320	Upper Sonoran Juniper	RG below WRC	bench above alluvial flats	0	open	east	280
LA 13015	450	1	Anasazi	5320	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	0	open	east	220
LA 13016	800	1	Lithic Unknown	5300	Upper Sonoran Juniper	RG below WRC	head of arroyo	27	290	east	600
LA 13017	2	1	Lithic Unknown	5280	Upper Sonoran Juniper	RG below WRC	gravel bench	n.d.	n.d.	east	460
LA 13018	120	1	Anasazi(?)	5320	Upper Sonoran Juniper	RG below WRC	gravel bench	4	245	east	380
LA 13019	3000	1	Lithic Unknown	5320	Upper Sonoran Juniper	Basin No. 1	coded area; arroyo	9	305	east	320

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13020	1000	1	Lithic Unknown	5320	Upper Sonoran Juniper	Basin No. 2	gravel bench	4	open	east	300
LA 13021	208	1	Lithic Unknown	5330	Upper Sonoran Juniper	RG below WRC	bench	11	90	east	440
LA 13022	1125	1	Lithic Unknown	5340	Upper Sonoran Juniper	RG below WRC	ridge top	4	175	east	360
LA 13023	3575	2	Lithic Unknown	5340	Upper Sonoran Juniper	Basin No. 2	gravel bench	5	270	east	240
LA 13024	450	1	Anasazi	5310	Upper Sonoran Juniper	RG/WRC	ridge top	7	235	east	100
LA 13025	3750	1	Lithic Unknown	5350	Upper Sonoran Juniper	RG below WRC	gravel bench	9	280	east	760
LA 13026	8100	4	Lithic Unknown	5380	Upper Sonoran Juniper	RG below WRC	gravel terrace	0	open	east	880
LA 13027	9000	1	Lithic Unknown	5340	Upper Sonoran Juniper	RG below WRC	gravel terrace	11	290	east	500
LA 13028	700	1	Lithic Unknown	5400	Upper Sonoran Juniper	Basin No. 1	gravel slope	16	325	east	840
LA 13029	3200	3	Lithic Unknown	5330	Upper Sonoran Juniper	Basin No. 1	cobble terrace	5	325	east	560
LA 13030	250	2	Anasazi	5380	Upper Sonoran Juniper	Basin No. 24	flood plain; arroyo	5	304	west	680
LA 13031	4420	1	Lithic Unknown	5390	Upper Sonoran Juniper	Basin No. 24	gravel slope	7	75	west	660
LA 13032	1	1	Unknown	5400	Upper Sonoran Juniper Grassland	Basin No. 24	gravel bench	n.d.	n.d.	west	680
LA 13033	700	1	Historic(?)	5420	Upper Sonoran Juniper	RG/WRC	basalt talus; bench	7	170	west	180
LA 13034	750	2	Historic(?)	5400	Upper Sonoran Juniper	RG/WRC	talus and bench interface	0	140	west	160
LA 13035	7000	2	Lithic Unknown	5400	Upper Sonoran Arid	Basin No. 1	gravel terrace	5	300	east	1100
LA 13036	3750	2	Lithic Unknown	5410	Upper Sonoran Juniper	Basin No. 1	ridge top	0	open	east	1360
LA 13037	7500	2	Lithic Unknown	5420	Upper Sonoran Juniper	Basin No. 1	talus and bench interface	18	240	east	1180
LA 13038	10,000	3	Lithic Unknown	5360	Upper Sonoran Juniper	Basin No. 1	alluvial bench	11	180	east	780
LA 13039	450	1	Anasazi	5340	Upper Sonoran Juniper	Basin No. 1	gravel terrace	7	135	east	400
LA 13040	1050	1	Anasazi	5340	Upper Sonoran Juniper	Basin No. 2	gravel terrace	7	300	east	420
LA 13041	750	1	Lithic Unknown	5380	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	27	180	east	460
LA 13042	75	1	Anasazi(?)	5350	Upper Sonoran Juniper	RG/WRC	gravel bench	n.d.	n.d.	east	360
LA 13043	2640	1	Lithic Unknown	5380	Upper Sonoran Juniper	RG/WRC	axial terrace	18	280	east	360

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13044	64	1	Anasazi(?)	5380	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	18	155	east	280
LA 13045	6300	1	Historic	5400	Upper Sonoran Juniper	RG/WRC	basalt, gravel terrace	45	125	west	140
LA 13046	250	1	Historic	5400	Upper Sonoran Juniper	RG/WRC	talus and bench interface	4	100	west	160
LA 13047	375	1	Anasazi(?)	5400	Upper Sonoran Juniper	RG/WRC	basalt talus, bench	7	300	west	160
LA 13048	8	1	Lithic Unknown	5375	Upper Sonoran Juniper	RG/WRC	basalt talus, cench	n.d.	n.d.	west	140
LA 13049	1000	2	Anasazi	5380	Upper Sonoran Arid	RG/WRC	ridge top; basalt talus	16	180	west	140
LA 13050	1040	4	Anasazi(?)	5340	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	9	315	west	140
LA 13051	36	1	Anasazi(?)	5360	Upper Sonoran Juniper	RG/WRC	gravel knoll	18	160	west	160
LA 13052	10,000	3	Lithic Unknown/ Anasazi(?)	5400	Upper Sonoran Juniper	RG/WRC	ridge top	6	265	west	80
LA 13053	[illegible]	1	Lithic Unknown	5410	Upper Sonoran Juniper	RG/WRC	ridge top	n.d.	n.d.	west	120
LA 13054	750	1	Anasazi(?)	5340	Upper Sonoran Arid	RG/WRC	gravel ridge top	0	open	west	100
LA 13055	7500	6	Anasazi(?)/Historic(?)	5410	Upper Sonoran Juniper	RG/WRC	bench above alluvial flats	9	105	west	160
LA 13056	2400	2	Lithic Unknown	5320	Upper Sonoran: Arid	RG/WRC	basalt talus and bench	11	n.d.	east	40
LA 13057	800	2	Anasazi	5330	Upper Sonoran Juniper	RG/WRC	arroyo	n.d.	n.d.	east	120
LA 13058	400	2	Anasazi/Historic(?)	5400	Upper Sonoran Arid	RG/WRC	basalt talus	18	25	east	80
LA 13059	150	1	Historic	5390	Upper Sonoran Juniper	RG/WRC	basalt talus	58	west	east	160
LA 13060	200	1	Anasazi(?)	5380	Upper Sonoran Arid	RG/WRC	gravel bench	11	340	east	100
LA 13061	12	1	Lithic Unknown	5390	Upper Sonoran Juniper	RG/WRC	gravel bench	n.d.	n.d.	west	140
LA 13062	350	1	Lithic Unknown	5380	Upper Sonoran Arid	RG/WRC	basalt talus, bench	0	open	east	160
LA 13063	300	1	Lithic Unknown	5400	Upper Sonoran Juniper	RG/WRC	gravel terrace	0	open	west	160
LA 13064	2400	5	Anasazi	5380	Upper Sonoran Arid	RG/WRC	talus and bench interface	27	10	east	180
LA 13065	n.d.	1	Lithic Unknown	5360	Upper Sonoran Juniper	RG/WRC	ridge top	n.d.	n.d.	west	80
LA 13066	200	1	Lithic Unknown / Anasazi(?)	5360	Upper Sonoran Arid	RG/WRC	basalt talus, bench	40	50	east	160

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13067	900	1	Anasazi(?)	5320	Upper Sonoran Arid	RG/WRC	bench above alluvial flats	5	245	east	120
LA 13068	1500	1	Anasazi(?)	5390	Upper Sonoran Arid	RG/WRC	basalt talus	18	10	east	200
LA 13069	50	1	Historic(?)	5340	Upper Sonoran Juniper	RG/WRC	slope	70	n.d.	west	60
LA 13070	4875	3	Anasazi	5460	Upper Sonoran Arid	RG/WRC	gravel bench	n.d.	10	east	300
LA 13071	25	1	Anasazi(?)	5420	Upper Sonoran Juniper	RG/WRC	basalt tlaus, bench	0	open	west	180
LA 13072	1800	3	Anasazi	5420	Upper Sonoran Arid	RG/WRC	ridge top	21	80	east	180
LA 13073	70	1	Anasazi(?)	5420	Upper Sonoran Juniper	RG/WRC	bench above river	9	110	west	160
LA 13074	525	1	Anasazi	5400	Upper Sonoran Arid	RG/WRC	basalt talus	27	125	east	160
LA 13075	36	1	Anasazi(?)	5420	Upper Sonoran Juniper	RG/WRC	rock slide, bench	27	110	west	140
LA 13076*	600	3	Anasazi	5320	Upper Sonoran Arid	RG/WRC	rock slide	27	n.d.	east	60
LA 13077	3500	1	Anasazi(?)	5460	Upper Sonoran Juniper	Capulin	bench	11	170	west	720
LA 13078	900	2	Anasazi	5360	Upper Sonoran Arid	RG/WRC	rock slide	0	85	east	120
LA 13079	4500	1	Anasazi(?)	5380	Upper Sonoran Juniper	Capulin	canyon bottom	7	160	west	740
LA 13080	3000	1	Anasazi	5360	Upper Sonoran Arid	RG/WRC	gravel bench	11	10	east	120
LA 13081	90	1	Anasazi(?)	5420	Upper Sonoran Juniper	Capulin	canyon bottom	5	205	west	960
LA 13082	40	1	Anasazi	5380	Upper Sonoran Arid	RG/WRC	talus and bench interface	7	15	east	180
LA 13083	25	1	Historic(?)	5400	Upper Sonoran Juniper	Capulin	talus and bench interface	7	11	west	880
LA 13084*	1200	3	Anasazi/Unknown	5380	Upper Sonoran Arid	RG/WRC	rock slide	n.d.	n.d.	east	100
LA 13085	80	1	Anasazi(?)	5380	Upper Sonoran Juniper	Capulin	basalt talus; canyon bottom	70	180	west	440
LA 13086*	1125	4	Anasazi	5310	Upper Sonoran Arid	RG/WRC	rock slide	7	70-110	east	100
LA 13087	48	1	Anasazi(?)	5420	Upper Sonoran Juniper	Capulin	gravel bench	18	30	west	220
LA 13289	n.d.	1	Historic	5410	Upper Sonoran Juniper	RG/WRC	basalt talus, bench	n.d.	n.d.	west	300
LA 13290	3000	1	Historic	5340	Upper Sonoran Juniper	RG/WRC	gravel bench	18	75	west	200
LA 13291*	1950	5	Anasazi(?)/Historic (?)	5340	Upper Sonoran Arid	RG/WRC	talus and bench interface	12	340	east	120
LA 13292*	4500	1	Anasazi	5360	Upper Sonoran Arid	RG/WRC	talus and bench interface	12	335	east	140

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13293*	160	1	Anasazi	5380	Upper Sonoran Arid	RG/WRC	steep slope	31	335	east	140
LA 13294	1575	1	Anasazi	5420	Upper Sonoran Arid	RG/WRC	basalt talus, bench	0	open	east	120
LA 13295	200	1	Anasazi(?)	5400	Upper Sonoran Arid	RG/WRC	exial terrace	21	340	east	80
LA 13296	875	1	Anasazi(?)	5360	Upper Sonorna Arid	RG/WRC	rock slide	27	335	east	60
LA 13297	25	1	Anasazi(?)	5335	Upper Sonoran Arid	RG/WRC	axial terrace	67	315	east	20
LA 13298	120	1	Anasazi(?)	5300	Upper Sonoran Arid	Basin No. 8	alluvial bench	0	open	east	20
LA 13299	3000	4	Anasazi(?)	5310	Upper Sonoran Arid	Basin No. 8	bench above alluvial flats	9	280	east	60
LA 13300	3000	4	Lithic Unknown/Anasazi/ Historic	5420	Upper Sonoran Arid	RG/WRC	bench above alluvial terrace	9	270	east	200
LA 13301	1000	5	Unknown	5350	Upper Sonoran Arid	RG/WRC	bench	7-27	170-230	east	140
LA 13302	16	1	Anasazi(?)	5410	Upper Sonoran Arid	RG/WRC	gravel banch	0	open	east	180
LA 13303	8750	1	Anasazi(?)	5400	Upper Sonoran Arid	RG/WRC	first alluvial terrace	0	245	east	260
LA 13304	700	1	Historic	5370	Upper Sonoran Arid	RG/WRC	first alluvial terrace	0	245	east	260
LA 13305	20	1	Unknown	5340	Upper Sonoran Arid	RG/WRC	alluvial fan	9	33	east	100
LA 13306	900	1	Historic	5360	Upper Sonoran Arid	RG/WRC	talus and bench interface	5	325	east	100
LA 13307	240	1	Anasazi(?)	5340	Upper Sonoran Arid	RG/WRC	bench	7	330	east	40
LA 13308	600	2	Lithic Unknown	5340	Upper Sonoran Arid	RG/WRC	gravel bench	n.d.	310	east	40
LA 13309	1500	2	Historic	5370	Upper Sonoran Arid	RG/WRC	talus and bench interface	7	10	east	80
LA 13310	25	1	Anasazi(?)	5420	Upper Sonoran Arid	RG/WRC	base of talus	n.d.	n.d.	east	160
LA 13311	n.d.	1	Anasazi(?)	5330	Upper Sonoran Arid	RG/WRC	terrace	n.d.	n.d.	east	20
LA 13312	225	3	Anasazi(?)	5345	Upper Sonoran Arid	RG/WRC	base of talus	11	100	east	160
LA 13313	4	1	Anasazi(?)	5370	Upper Sonoran Arid	RG/WRC	slope; base of talus	n.d.	n.d.	east	120
LA 13314	20	1	Unknown	5410	Upper Sonoran Arid	RG/WRC	base of talus	n.d.	n.d.	east	160
LA 13315	25	1	Unknown	5400	Upper Sonoran Arid	RG/WRC	cliff edge; dunes; terrace	0	310	east	60
LA 13316	20	1	Anasazi	5440	Upper Sonoran Arid	Montoso	basalt talus	100	350	east	10
LA 13317	30	1	Unknown	5380	Upper Sonoran Arid	Montoso	basalt talus	47	50	east	160
LA 13318	150	1	Anasazi(?)	5380	Upper Sonoran Arid	RG/WRC	basalt tlaus	0	310	east	60

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13319	1500	3	Anasazi(?)	5345	Upper Sonoran Arid	RG/WRC	alluvial fan	4	350	east	10
LA 13320	96	1	Historic	5440	Upper Sonoran Arid	RG/WRC	banch above river	5	350	east	40
LA 13321	36	1	Lithic Unknown	5340	Upper Sonoran Arid	RG/WRC	bench above river	n.d.	n.d.	east	10
LA 13322	12	1	Anasazi(?)	5460	Upper Sonoran Juniper Grassland	Santa Fe	talus and bench interface	n.d.	n.d.	east	8640
LA 13323	750		Anasazi(?)	5440	Upper Sonoran Juniper Grassland	Santa Fe	gravel terrace	3	88	east	7280
LA 13324	250	1	Anasazi(?)	5440	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	7	84	east	7280
LA 13325	48	1	Anasazi	5430	Upper Sonoran Juniper Grassland	Santa Fe	flood plain	n.d.	n.d.	east	7840
LA 13326*	450	1	Anasazi(?)	5440	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	5	35	east	7980
LA 13327	30	1	Anasazi(?)	5440	Upper Sonoran Juniper Grassland	Santa Fe	first alluvial terrace	45	60	east	7100
LA 13328	50	1	Anasazi(?)	5435	Upper Sonoran Juniper Grassland	Santa Fe	steep slope; terrace	17	30	east	7040
LA 13329*	36	1	Anasazi(?)	5415	Upper Sonoran Juniper Grassland	Santa Fe	gravel terrace	0	open	east	6800
LA 13330	700	1	Anasazi(?)	5410	Upper Sonoran Juniper Grassland	Santa Fe	first alluvial terrace	7	75	east	6560
LA 13331*	120	1	Anasazi(?)	5415	Upper Sonoran Juniper Grassland	Santa Fe	first alluvial terrace	38	45	east	6480
LA 13332*	300	1	Anasazi(?)	5420	Upper Sonoran Juniper Grassland	Santa Fe	first alluvial terrace	18	245	east	6480
LA 13333*	150	1	Anasazi(?)	5420	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	18	310	east	6500
LA 13334	200	1	Anasazi(?)	5420	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	27	60	east	6420
LA 13335	9	1	Anasazi(?)	5410	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	25	60	east	6320
LA 13336	80	1	Anasazi(?)	5400	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	n.d.	n.d.	east	6240
LA 13337	25	1	Unknown	5400	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	n.d.	n.d.	east	6100

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13338	240	1	Anasazi	5400	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	0	70	east	6000
LA 13339	4	1	Unknown	5400	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	n.d.	n.d.	east	5900
LA 13340	300	1	Anasazi	5450	Upper Sonoran Juniper Grassland	Santa Fe	ridge top	0	5	east	5920
LA 13341	4	1	Unknown	5440	Upper Sonoran Juniper Grassland	Santa Fe	gravel terrace	9	80	east	5880
LA 13342	1050	1	Lithic Unknown	5440	Upper Sonoran Juniper Grassland	Santa Fe	ridge top	0	open	east	5180
LA 13343	150	1	Lithic Unknown	5375	Upper Sonoran Juniper Grassland	Santa Fe	gravel terrace	7	30	east	4960
LA 13344	375	1	Lithic Unknown	5380	Upper Sonoran Juniper Grassland	Santa Fe	bench above alluvial flats	5	28	east	5020
LA 13345	20	1	Lithic Unknown	5370	Upper Sonoran Juniper Grassland	Santa Fe	slope	7	30	east	4820
LA 13346	75	1	Anasazi(?)	5445	Upper Sonoran Juniper Grassland	Santa Fe	ridge top	0	open	east	5440
LA 13347	36	1	Anasazi(?)	5455	Upper Sonoran Juniper Grassland	Santa Fe	gravel terrace	4	120	east	5240
LA313348	12500	2	Lithic Unknown	5420	Upper Sonoran Juniper Grassland	Basin No. 1	gravel ridge top	0	open	east	680
LA 13349	400	1	Lithic Unknown	5410	Upper Sonoran Juniper	Canada de Cochiti	flood plain	n.d.	n.d.	east	3120
LA 13350*	7500	2	Lithic Unknown	5410	Upper Sonoran Juniper	Canada de Cochiti	gravel terrace	0	open	east	1920
LA 13351*	5000	1	Lithic Unknown	5420	Upper Sonoran Juniper	Canada de Cochiti	gravel terrace	0	open	east	2080
LA 13352*	450	1	Lithic Unknown	5420	Upper Sonoran Juniper	Canada de Cochiti	gravel terrace	5	185	east	2180
LA 13353*	800	1	Lithic Unknown	5420	Upper Sonoran Juniper	Canada de Cochiti	gravel terrace	12	100	east	1800
LA 13354	24	1	Lithic Unknown	5420	Upper Sonoran Juniper	RG/WRC	arroyo	n.d.	n.d.	east	100
LA 13355	160	1	Anasazi(?)	5450	Upper Sonoran Juniper	RG/WRC	bench above river	11	150	east	80
LA 13356	240	1	Anasazi	5450	Upper Sonoran Juniper	RG/WRC	bench	11	120	east	60
LA 13357	500	2	Historic	5460	Upper Sonoran Juniper	RG/WRC	alluvial fan	11	320	east	180
LA 13358	3600	1	Lithic Unknown	5425	Upper Sonoran Juniper	RG/WRC	alluvial fan	n.d.	n.d.	east	80

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13359	3600	2	Lithic Unknown/Historic	5430	Upper Sonoran Juniper	RG/WRC	alluvial fan	9	300	east	60
LA 13360	28	1	Historic	5430	Upper Sonoran Juniper	RG/WRC	alluvial fan	n.d.	n.d.	east	140
LA 13361	200	1	Unknown	5440	Upper Sonoran Juniper	Basin No. 13	alluvial fan	n.d.	n.d.	east	140
LA 13362	200	1	Lithic Unknown	5420	Upper Sonoran Juniper	RG/WRC	first alluvial terrace	0	55	east	60
LA 13363	100	2	Historic(?)	5435	Upper Sonoran Juniper	RG/WRC	alluvial fan	4	300	east	80
LA 13364	25	1	Anasazi(?)	5430	Upper Sonoran Juniper	RG/WRC	talus and bench interface	0	260	east	20
LA 13365	200	2	Anasazi	5460	Upper Sonoran Arid	Santa Cruz	first alluvial terrace	n.d.	open	west	140
LA 13366	600	2	Historic	5450	Upper Sonoran Arid	Ancho	arroyo bottom	4	135	west	200
LA 13367	700	2	Historic	5455	Upper Sonoran Arid	Ancho	canyon bottom	11	105	west	240
LA 13368	150	2	Anasazi(?)/Unknown	5460	Upper Sonoran Arid	Ancho	basalt talus slope	16	90	west	320
LA 13369	25	1	Historic	5460	Upper Sonoran Arid	Ancho	base of talus	12	95	west	360
LA 13370	6400	6	Unknown	5450	Upper Sonoran Juniper Grassland	Pajarito	alluvial fan	7	100	west	100
LA 13371	1600	2	Anasazi(?)	5455	Upper Sonoran Juniper Grassland	Pajarito	talus and bench interface	7	70	west	100
LA 13372	300	2	Anasazi(?)	5445	Upper Sonoran Juniper Grassland	RG/WRC	basalt talus slope	33	90	west	100
LA 13373	25	1	Anasazi(?)	5440	Upper Sonoran Juniper Grassland	RG/WRC	talus slope and river bench interface	47	33	west	80
LA 13374	64	1	Anasazi	5457	Upper Sonoran Juniper	RG/WRC	first alluvial terrace	0	100	west	100
LA 13375	64	1	Anasazi(?)	5445	Upper Sonoran Juniper	RG/WRC	bench above river	0	open	west	100
LA 13376	100	1	Anasazi	5445	Upper Sonoran Juniper	RG/WRC	bench above river	7	135	west	100
LA 13377	250	1	Historic	5440	Upper Sonoran Juniper	RG/WRC	gravel terrace	5	120	west	60
LA 13378	19500	6	Anasazi(?)	5440	Upper Sonoran Juniper	RG/WRC	axial terrace	14	100	west	100
LA 13379	100	1	Anasazi(?)	5455	Upper Sonoran Juniper	RG/WRC	axial terrace	5	130	west	20
LA 13380	100	1	Anasazi(?)	5440	Upper Sonoran Juniper	RG/WRC	basalt talus, bench	5	130	west	100
LA 13381	200	1	Historic	5440	Upper Sonoran Juniper	RG/WRC	slope	7	115	west	20
LA 13382	25	1	Anasazi(?)	5460	Upper Sonoran Juniper	RG/WRC	bench	31	155	west	60

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13383	3250	4	Lithic Unknown/ Anasazi(?)	5440-5460	Upper Sonoran Juniper	RG/WRC	sand dune	18		west	140
LA 13384	700	1	Anasazi(?)	5440	Upper Sonoran Juniper	RG/WRC	axial terrace	12	70	west	60
LA 13385	1000	1	Anasazi(?)	5440	Upper Sonoran Juniper	Basin No. 24	canyon bottom	5	125	west	40
LA 13386	150	1	Anasazi(?)	5460	Upper Sonoran Juniper	Basin No. 24	gravel ridge top	18	100	west	1240
LA 13387	25	1	Anasazi(?)	5445	Upper Sonoran Juniper	Basin No. 24	arroyo bottom	11	290	west	1240
LA 13388	100	1	Anasazi(?)	5440	Upper Sonoran Juniper Grassland	Basin No. 24	ridge top	7	210	west	640
LA 13389	40	1	Anasazi(?)	5390	Upper Sonoran Juniper Grassland	Basin No. 24	bench	31	125	west	560
LA 13390	2275	2	Anasazi(?)	5340	Upper Sonoran Juniper	RG/WRC	gravel terrace	5	290	east	40
LA 13391	250	1	Historic	5420	Upper Sonoran Juniper	RG/WRC	gravel slope	25	190	east	120
LA 13392	7500	3	Anasazi(?)	5400	Upper Sonoran Juniper	RG/WRC	steep slope, trench	0	290	east	80
LA 13393	100	1	Lithic Unknown	5420	Upper Sonoran Juniper	Basin No. 1	ridge top	0	open	east	200
LA 13394	625	1	Lithic Unknown	5420	Upper Sonoran Juniper	Basin No. 1	second gravel terrace	0-11	250	east	1040
LA 13395	400	2	Lithic Unknown	5420	Upper Sonoran Juniper	Basin No. 1	gravel ridge	5-11	325	east	1080
LA 13396	225	1	Anasazi	5440	Upper Sonoran Juniper	RG/WRC	gravel ridge	9	275	east	980
LA 13397	100	1	Anasazi(?)	5440	Upper Sonoran Juniper	RG/WRC	second gravel terrace	0	265	east	940
LA 13398	20	1	Anasazi(?)	5530	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	1100
LA 13399	6	1	Unknown	5520	Upper Sonoran Juniper	Basin No. 2	basalt talus; mesa top	12	270	east	880
LA 13400	1500	2	Lithic Unknown/Anasazi(?)	5520	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	900
LA 13401	150	1	Anasazi	5525	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	720
LA 13402	2500	1	Anasazi(?)	5535	Upper Sonoran Juniper	Basin No. 2	mesa top	4	260	east	620
LA 13403	49	1	Anasazi(?)	5540	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	520
LA 13404	100	1	Anasazi(?)	5535	Upper Sonoran Juniper	Basin No. 2	mesa top	5	open	east	6040
LA 13405	900	1	Anasazi(?)	5535	Upper Sonoran Juniper	Basin No. 2	mesa top; slope	5	west	east	540
LA 13406	300	1	Anasazi(?)	5325	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	620
LA 13407	60	1	Unknown	5530	Upper Sonoran Juniper	Basin No. 2	mesa top; slope	7	s.e.	east	520

TABLE III.4.2 (con't)

SITE NUMBER	SITE SIZE	P.	PERIOD	ELEV. (feet)	ECOLOGICAL COMMUNITY	DRAINAGE	PHYSIOGRAPHIC SITUATION	SLOPE	EXPOS.	SIDE	DIST.
LA 13408	4000	2	Lithic Unknown/Anasazi	5540	Upper Sonoran Juniper	Santa Fe	bank of arroyo	0	open	east	6040
LA 13409	5400	2	Anasazi(?)/Historic(?)	5460	Upper Sonoran Arid	Ancho	basalt bench	0	190	west	140
LA 13410	250	1	Anasazi	5415	Upper Sonoran Arid	Ancho	fanglomerate	4	180	west	80
LA 13446	96	1	Anasazi(?)	5320	Upper Sonoran Arid	RG/WRC	talus slope	5	330	east	60
LA 13447	4	1	Unknown	5420	Upper Sonoran Arid	RG/WRC	talus slope	n.d.	n.d.	east	80
LA 13448	2100	3	Historic(?)	5380	Upper Sonoran Arid	RG/WRC	talus and bench interface	9-18	west	east	140
LA 13449	6	1	Anasazi(?)	5380	Upper Sonoran Arid	RG/WRC	bench above river	5	west	east	40
LA 13450	25	1	Anasazi(?)	5400	Upper Sonoran Arid	RG/WRC	gravel bench	0	west	east	40
LA 13451	1300	3	Historic	5360	Upper Sonoran Arid	RG/WRC	bench above river	5	270	east	40
LA 13452	700	2	Anasazi(?)	5380	Upper Sonoran Arid	RG/WRC	talus and bench interface	12	west	east	10
LA 13453	375	3	Anasazi(?)/Historic(?)	5410	Upper Sonoran Juniper	Water	alluvial fan	9	150	west	20
LA 13454	100	1	Anasazi(?)	5525	Upper Sonoran Juniper	Basin No. 2	mesa top	4	s.w.	east	800
LA 13455	100	2	Anasazi	5530	Upper Sonoran Juniper	Basin No. 2	gentle slope	5	260	east	780
LA 13456	1800	1	Unknown	5540	Upper Sonoran Juniper	Basin No. 2	mesa top	0	open	east	220
LA 13457	1500	3	Anasazi/Unknown	5525	Upper Sonoran Juniper	Basin No. 2	mesa top	0-5	280	east	1220
LA 13458	900	1	Historic	5440	Upper Sonoran Juniper	Capulin	canyon bottom	18	170	west	960

KEY: * excavated or tested sites
† number of proveniences
†† side of Rio Grande
††† distance to Rio Grande, in meters, estimated from 7.5 minute USGS topographic map

TABLE III.4.3

SITE DESCRIPTION BY PROVENIENCE – PERMANENT POOL SURVEY

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 5011/1	408	Anasazi (?)	late P-III (?)/early P-IV (?)	2-3 contiguous masonry rooms; lithics and ceramics
LA 5012/1	504	Anasazi	P-III (?)	2-3 contiguous masonry rooms; lithics and ceramics
LA 5013/1	28	Anasazi (?)	P-IV (?)	1 masonry room
LA 5014/1	142	Anasazi	late P-III	1 roomblock, 12-17 masonry rooms; lithics and ceramics
LA 5015/1	30	Anasazi (?)	late P-III (?)	1 masonry room; lithics and ceramics
LA 9138/1	198	Historic	18th century (?)	2 contiguous masonry rooms; ceramics
2	440	Historic	18th century (?)	2 contiguous masonry rooms
3	128	Historic	18th century (?)	1 masonry room
4	36	Unknown		1 masonry room
5	16	Unknown		1 masonry room
6	330	Historic	18th century(?); post-1900	2 contiguous rooms; road cut (?)
LA 9139/1	200	Historic	18th century(?)	1-2 contiguous masonry rooms; 1 hearth within structure; ceramics
LA 10110/1	45	Historic	18th century(?); post-1900	2 contiguous masonry rooms; 1 modern hearth; 1 lithic and 1 historic artifact
2	1	Historic	1950-1975	Recent campsite (1 hearth); ceramics
3	1	Historic	1950-1975	Recent campsite (1 hearth)
4	3	Historic	1950-1975	Recent campsite (1 hearth); lithic and historic artifacts
5	40	Historic (?)		Isolated wall
6	—	Historic	20th century (?)	Road cut; petroglyphs
LA 10111/1	48	Historic	early 20th century	1 masonry room; historic artifacts*
2	168	Lithic Unknown		Lithic scatter
3	552	Historic		2 masonry corrals
4	525	Historic		1 masonry corral
5	624	Historic		1 masonry corral
6	—	Unknown		Petroglyph
LA 12160/1	20	Historic (?)	18th century (?)	1 masonry room; ceramics
LA 12161/1	180	Anasazi (?) Historic	P-IV (?) 18th century	1 rectangular masonry room; 1 hearth within structure; lithics and ceramics
2	—	Anasazi (?)		Petroglyph
LA 12434/1	1625	Historic	late 19th, early 20th century	Historic artifact scatter
LA 12435/1	252	Historic	1950-1975	Recent campsite (2 hearths); historic artifacts
LA 12436/1	3750	Lithic Unknown		Firecracked rock—lithic scatter

* sample from entire site

TABLE III.4.3 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 12437/1	80	Historic	1950-1975	Lean-to; cairn; historic artifacts
LA 12438/1	150	Anasazi	mid P-IV	1 masonry room; ceramics
LA 12439/1	2600	Lithic Unknown		6 hearths; lithic and ceramic scatter
LA 12440/1	1350	Anasazi	late P-III/P-IV (?)	1-2 contiguous masonry rooms; lithics and ceramics
LA 12441/1	50	Unknown		2 hearths (?)
LA 12442/1	2805	Lithic Unknown		Lithic scatter
LA 12443/1	348	Anasazi	early P-IV	1 masonry room; lithics and ceramics
LA 12444/1	2475	Lithic Unknown		3 hearths; firecracked rock-lithic scatter
LA 12445/1	731	Lithic Unknown		2 hearths; lithic scatter
LA 12446/1	144	Lithic Unknown		1 hearth; lithics and ceramics
LA 12447/1	25	Anasazi (?)	early P-IV (?)	1 masonry room; ceramics
2	800	Lithic Unknown		Firecracked rock-lithic scatter
LA 12448/1	16	Lithic Unknown		Firecracked rock-lithic scatter*
2	180	Lithic Unknown		Firecracked rock-lithic scatter*
3	—	Lithic Unknown		Lithic scatter* (2 sherds recovered, no provenience)
LA 12449/1	800	Historic	early 20th century	1 masonry room; 2 corrals; historic artifacts
LA 12450/1	25	Lithic Unknown		Lithic scatter
LA 12451/1	20	Anasazi (?)		2 contiguous masonry rooms; lithic scatter
LA 12452/1	72	Historic	18th century (?)	1-4 contiguous masonry rooms; lithics and ceramics
2	96	Anasazi	P-IV	1 masonry room; lithics and ceramics
LA 12453/1	96	Historic	late 19th, early 20th century	1 masonry room; single piston engine (pump?), historic artifacts
LA 12454/1	190	Anasazi Historic	early P-IV 1650-1780 (?)	2 contiguous rooms; lithics and ceramics
2	300	Anasazi (?) Historic (?)	P-IV (?) 18th century (?)	Lithic and ceramic scatter
LA 12455/1	140	Lithic Unknown		Firecracked rock-lithic scatter
2	48	Lithic Unknown		Firecracked rock-lithic scatter
LA 12456/1	42	Lithic Unknown		Slab-lined feature (?); lithics
2	3	Lithic Unknown		Slab-lined hearth (?); lithics
3	36	Lithic Unknown		Firecracked rock-lithic scatter
4	370	Lithic Unknown		Firecracked rock-lithic scatter
LA 12457/1	16	Unknown		Rockshelter enclosed by wall; lithics
2	—	Unknown		Petroglyph
LA 12458/1	120	Historic	late 19th, early 20th century	Historic artifact scatter
LA 12459/1	21	Lithic Unknown		Firecracked rock-lithic scatter

* sample from entire site

TABLE III.4.3 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 12459/2	40	Historic		1 brush corral; firecracked rock-lithic scatter
LA 12460/1	9	Lithic Unknown		Firecracked rock-lithic scatter
2	260	Lithic Unknown		Firecracked rock-lithic scatter
3	25	Lithic Unknown		1 hearth; firecracked rock-lithic scatter
4	10	Lithic Unknown		1 hearth; firecracked rock-lithic scatter
5	100	Lithic Unknown		Firecracked rock-lithic scatter
LA 12461/1	100	Anasazi (?)	P-IV (?)	Rubble mound; ceramics
2	150	Anasazi	P-IV	Rubble mound; lithics and ceramics
3	10,000+	Anasazi (?)		Grids or terraces (150m x 100m)
LA 12462/1	400	Anasazi (?)		1 masonry room; isolated projectile point and coffee can
LA 12463/1	1200	Lithic Unknown		Firecracked rock-lithic scatter
LA 12464/1	2	Unknown		1 masonry room
LA 12465/1	—	Historic (?)		Petroglyph
2	50	Historic (?)		2 contiguous masonry rooms
3	25	Historic (?)		1 masonry room
4	25	Historic (?)		1 masonry room; isolated wall; lithics
5	50	Historic (?)		2 contiguous masonry rooms
6	100	Historic (?)		1 masonry corral; isolated wall
7	—	Historic (?)		Petroglyph
8	25	Historic (?)		1 masonry storage (?) room
9	36	Historic (?)		1 masonry room
LA 12466/1	50	Historic (?)		1 masonry room
2	25	Historic (?)	18th century (?)	1 masonry room; lithics and ceramics
3	8	Historic (?)		Rubble mound; indeterminate number of rooms
LA 12467/1	195	Historic (?)		Semicircular masonry wall
2	48	Historic (?)		Semicircular masonry wall
LA 12468/1	25	Lithic Unknown		Lithic scatter
2	25	Lithic Unknown		Lithic scatter
LA 12469/1	50	Anasazi (?) Historic (?)	mid P-IV (?) 18th century (?)	1 masonry room; metate and ceramics
LA 12470/1	25	Anasazi (?)	P-IV (?)	1 structure; ceramics
LA 12471/1	100	Historic (?)		2 contiguous masonry rooms; ceramics
LA 12472/1	25	Historic	early 20th century	Recent campsite (2 hearths); lithics and historic artifacts
2	4	Historic	1950-1975	Recent campsite (1 hearth)
3	1625	Historic	1675-1800 (?); early 20th century	Artifactual scatter; lithics, ceramics, metal, glass

TABLE III.4.3 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 12472/4	1	Historic	1953-1970	Recent campsite (1 hearth); historic artifact
5	15			Isolated wall
6	—	Unknown		Petroglyph
7	10			Isolated wall
LA 12473/1	4	Historic	1950-1975	Recent campsite (1 hearth)
LA 12474/1	375	Historic	20th century	Isolated wall; mano and historic artifacts
LA 12475/1	4	Historic	1950-1975	Recent campsite (1 hearth)
LA 12476/1	30	Historic	1950-1975	Recent campsite (1 hearth); historic artifacts
LA 12477/1	9	Historic	1950-1975	Recent campsite (1 hearth); historic artifacts
2	9	Historic	1950-1975	Recent campsite (1 hearth); historic artifacts
3	25	Historic	1950-1975	Tent base; 1 recent hearth
LA 12478/1	126	Lithic Unknown		Lithic scatter; 2 sherds
LA 12479/1	400	Lithic Unknown		Lithic scatter; 1 sherd
LA 12480/1	36	Anasazi (?)		1-3 contiguous masonry rooms; lithics
LA 12481/1	520	Lithic Unknown		Lithic scatter; 1 sherd
2	500	Lithic Unknown		1 hearth; firecracked rock-lithic scatter
3	250	Lithic Unknown		1 possible hearth; firecracked rock-lithic scatter
LA 12482/1	1150	Anasazi	P-IV	Lithic and ceramic scatter
LA 12483/1	230	Anasazi	early P-IV	1 hearth, firecracked rock-lithic and ceramic scatter
LA 12484/1	25	Historic	1950-1975	Recent campsite (1 hearth); historic artifacts
LA 12485/1	300	Historic	late 19th, early 20th century	Sheep pen; lithics, ceramics and historic artifacts
2	—	Unknown		Petroglyph
LA 12486/1	130	Lithic Unknown		Firecracked rock-lithic and ceramic scatter
LA 12487/1	18	Historic	1950-1975	Recent campsite (2 hearths); firecracked rock
LA 12488/1	90	Historic	early 20th century	1 masonry structure; historic artifact
LA 12489/1	60	Historic	late 19th, early 20th century	1 masonry structure; lithics, ceramics and historic artifacts
2	—	Historic (?)		Petroglyph
LA 12490/1	98	Lithic Unknown		Lithic scatter; 2 sherds
LA 12491/1	—	Unknown		Petroglyph
2	36	Lithic Unknown		Lithic scatter; 1 sherd
LA 12492/1	28	Unknown		1 masonry room
LA 12493/1	9	Historic	1950-1975	Recent campsite (1 hearth)
LA 12494/1	1248	Lithic Unknown		Firecracked rock-lithic scatter
LA 12495/1	150	Lithic Unknown		Firecracked rock-lithic scatter
LA 12496/1	180	Lithic Unknown		Firecracked rock-lithic scatter; 3 sherds

TABLE III.4.3 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 12497/1	12	Unknown		1 masonry room
LA 12498/1	25	Unknown		1 masonry room
LA 12499/1	1	Lithic Unknown		1 hearth; lithic scatter
2	2400	Lithic Unknown		Lithic scatter
LA 12500/1	600	Historic	post-1920	Firecracked rock-historic artifact scatter
2	60	Historic	early 20th century	Historic artifacts
LA 12501/1	9	Unknown		1 masonry room
LA 12502/1	1750	Lithic Unknown		Firecracked rock-lithic scatter
LA 12503/1	200	Lithic Unknown		1 hearth; lithic scatter. 1 sherd
LA 12504/1	1000	Historic		2-3 masonry corrals
LA 12505/1	25	Historic (?)		1 masonry structure
LA 12506/1	1000	Historic (?)		Isolated masonry wall (40m in length)
LA 12507/1	15	Historic (?)	post 1680 (?)	1 masonry room; 1 sherd
LA 12508/1	900	Historic		1 masonry room; 2 masonry corrals;isolated wall; lithics
LA 12509/1	24	Anasazi (?)		1 masonry room; lithics
2	48	Unknown		Lithics (75 axes) (?)
LA 12511/1	300	Anasazi	late P-III (?)/P-IV (?)	3 contiguous masonry rooms; lithics and ceramics
LA 12512/1	250	Anasazi	early P-IV	1 masonry room; lithics and ceramics
LA 12513/1	20	Anasazi (?)	early P-IV (?)	1 masonry room; lithics and ceramics
LA 12514/1	36	Anasazi	early P-IV	2 contiguous masonry rooms; lithics and ceramics
2	400	Anasazi	early P-IV	2 masonry rooms; lithics and ceramics
LA 12515/1	24	Unknown		1 depression
LA 12516/1	36	Unknown		1 masonry room
LA 12517/1	4	Anasazi (?)	P-IV (?)	1 masonry room; lithics, 1 sherd
2	12	Lithic Unknown		Lithic scatter; 1 sherd
3	—	Anasazi (?)		Petroglyph
4	3	Anasazi (?)		Isolated wall
LA 12518/1	49	Anasazi (?)		1 masonry wall
LA 12519/1	64	Anasazi (?)	early P-IV (?)	1 masonry room; lithics and ceramics
LA 12520/1	64	Anasazi (?)		1 masonry room; lithics
LA 12521/1	495	Lithic Unknown		Firecracked rock-lithic scatter
2	—	Lithic Unknown		Lithic scatter
LA 12522/1	30	Anasazi	late P-III (?); early P-IV (?)	2 contiguous masonry rooms; 1 depression (pithouse?) lithics and ceramics
LA 12523/1	100	Historic		1 masonry corral; petroglyph
LA 12524/1	750	Historic (?)		3 noncontiguous masonry structures? lithics, ceramics
LA 12525/1	875	Historic(?)		2 continuous masonry rooms; isolated wall; petroglyph; lithic and historic artifacts

TABLE III.4.4

SITE DESCRIPTION BY PROVENIENCE – FLOOD CONTROL POOL SURVEY

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 5017/ 1	150	Historic (?)	1650 (?)	1 masonry room; 2 sherds
LA 10114/ 1	9	Anasazi (?)	P-IV (?)	1 masonry room; isolated wall; lithics
2	n.d.	Anasazi(?) Historic(?)		Isolated wall; petroglyphs; lithics
LA 11591/ 1	150	Lithic Unknown		Lithic scatter
2	900	Lithic Unknown		Lithic scatter
3	1700	Lithic Unknown		Lithic scatter
4	900	Lithic Unknown		Lithic scatter
LA 11592/ 1	4	Lithic Unknown		1 possible hearth; lithic scatter
2	6	Lithic Unknown		1 hearth; lithic scatter
LA 12158/ 1	3500	Anasazi	late P-III (?)	4 noncontiguous masonry structures; isolated walls; terraces; petroglyph; lithics and ceramics
LA 12162/ 1	1400	Anasazi (?) Historic (?)	P-IV (?) 18th century (?)	Rubble (1 room?); 1 possible masonry corral; petroglyphs; lithics and ceramics
LA 12163/ 1	n.d.	Lithic Unknown		Lithic scatter
2	1200	Anasazi (?)		1 masonry room; isolated wall; 1 hearth; petroglyphs
3	6	Anasazi	early-mid P-IV	Lithics and ceramic scatter; petroglyphs
4	675	Anasazi (?)		9 masonry rooms (only 2 are contiguous)
LA 12172/ 1	36	Anasazi (?)	mid P-IV (?)	Rubble (1 room?); 2 sherds
LA 12510/ 1	10	Anasazi (?)		2 contiguous masonry rooms
LA 12579/ 1	2400	Anasazi	early P-IV	4 roomblocks, 200-400 rooms arranged around a single plaza; 5 kivas; terraces; outlying isolated rooms
LA 12893/ 1	320	Lithic Unknown		5 concentrations of rock (possibly hearths); lithics
2	500	Lithic Unknown		7 concentrations of rock (possible hearths); lithics
3	105	Lithic Unknown		4 concentrations of rock (possible hearths:) firecracked rock and lithics
LA 13010/ 1	420	Lithic Unknown		Lithic scatter
LA 13011/ 1	4000	Historic	early 20th century	Historic artifact scatter (possibly associated with Boom); petroglyphs
LA 13012/ 1	1500	Anasazi	early P-IV	1 hearth, possibly more; lithics and ceramics
LA 13014/ 1	16	Anasazi	early P-IV	Rubble (1 room?); lithics and ceramics
2	200	Anasazi	early P-IV	Lithic and ceramic scatter
LA 13015/ 1	195	Anasazi	mid P-IV	[illegible] contiguous masonry rooms; lithics and ceramics
LA 13016/ 1	800	Lithic Unknown		Lithic scatter
LA 13017/ 1	n.d.	Lithic Unknown		1 possible hearth; firecracked rock, lithics

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13018/ 1	120	Anasazi (?)	P-IV (?)	2 contiguous masonry rooms; lithics and ceramics
LA 13019/ 1	3000	Lithic Unknown		3 hearths, firecracked rock, lithics and ceramics
LA 13020/ 1	1000	Anasazi	early P-IV	4 hearths, firecracked rock and lithics
LA 13021/ 1	208	Anasazi	early P-IV	1 masonry room; 1 possible hearth; lithics and ceramics
LA 13022/ 1	1125	Lithic Unknown		5 hearths; firecracked rock, lithics and ceramics
LA 13023/ 1	n.d.	Lithic Unknown		1 possible hearth; firecracked rock, lithics and ceramics
2	n.d.	Lithic Unknown		Lithic scatter
LA 13024/ 1	450	Anasazi	early P-IV	2 contiguous masonry rooms; firecracked rock; lithics and ceramics
LA 13025/ 1	3750	Lithic Unknown		Minimum of 3 hearths; firecracked rock and lithics
LA 13026/ 1	150	Lithic Unknown		Lithic scatter
2	100	Lithic Unknown		2 hearths; lithics
3	130	Lithic Unknown		2 hearths
4	100	Lithic Unknown		Lithic scatter
LA 13027/ 1	9000	Lithic Unknown		4 possible hearths; firecracked rock, lithics, 1 sherd
LA 13028/ 1	700	Lithic Unknown		2 hearths; lithics, 1 sherd
LA 13029/ 1	625	Lithic Unknown		3-4 hearths; firecracked rock, lithics
2	300	Lithic Unknown		1 hearth; lithics
3	30	Lithic Unknown		Lithic scatter
LA 13030/ 1	100	Anasazi	early-mid P-IV	1 masonry room (?); lithics and ceramics
2	6	Anasazi (?)		1 masonry room (?)
LA 13031/ 1	4420	Lithic Unknown		1 hearth; lithics, 1 sherd
LA 13032/ 1	1	Unknown		1 structure
LA 13033/ 1	700	Historic (?)		1 room; 2 ovens (?); lithics
LA 13034/ 1	12	Historic (?)		1 room; petroglyphs; lithics
2	4	Historic (?)		1 room; lithics
LA 13035/ 1	7000	Lithic Unknown		1 hearth; firecracked rock, lithics
LA 13036/ 1	3750	Lithic Unknown		Lithic scatter
LA 13037/ 1	12	Lithic Unknown		Lithic scatter
2	11250	Lithic Unknown		Lithic scatter
LA 13038/ 1	1600	Lithic Unknown		8-10 possible hearths; lithics
2	5700	Lithic Unknown		Lithic scatter, 3 sherds
3	1	Unknown		Rock concentration, roughly linear: lithics
LA 13039/ 1	450	Anasazi	early P-IV	Firecracked rock-lithic and ceramic scatter

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.	PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13040/ 1	1050	Lithic Unknown		1 possible hearth; firecracked rock; lithics; 2 sherds
LA 13041/ 1	750	Lithic Unknown		Lithic scatter
LA 13042/ 1	75	Anasazi (?)		1 structure; terraces (13m^2); lithics
LA 13043/ 1	2640	Lithic Unknown		Lithic scatter
LA 13044/ 1	64	Anasazi (?)		1 masonry room; lithics
LA 13045/ 1	6300	Historic (?)		1 structure; isolated wall; petroglyph
LA 13046/ 1	250	Historic	post-1850	1 masonry corral; petroglyphs; lithics and historic artifacts
LA 13047/ 1	375	Anasazi (?)	early P-IV (?)	4 contiguous masonry rooms; 1 isolated masonry room; lithics, 1 sherd
LA 13048/ 1	8	Lithic Unknown		Lithic scatter
LA 13049/ 1	150	Anasazi	late P-III (?), early P-IV	1 masonry room; lithics and ceramics
2	25	Unknown		1 (?) structure
LA 13050/ 1	12	Anasazi (?)	early P-IV (?)	2 contiguous masonry rooms; lithics, 1 sherd
2	1	Anasazi (?)		1 structure; lithics
3	n.d.	Anasazi (?)		Lithic scatter; petroglyphs
4	16	Anasazi (?)		2 check dams; lithics
LA 13051/ 1	36	Anasazi (?)		Terraces (36m^2)
LA 13052/ 1	n.d.	Anasazi (?)		Petroglyph
2	16	Anasazi (?)		Terraces (16m^2); lithics
3	120	Lithic Unknown		Lithic scatter
LA 13053/ 1	600	Lithic Unknown		Lithic scatter
LA 13054/ 1	750	Anasazi (?)	P-IV (?)	2 noncontiguous masonry rooms; 1 hearth; petroglyph; lithics, 1 sherd
LA 13055/1	25	Anasazi (?) Historic (?)	early P-IV (?) 18th century (?)	1 masonry room, petroglyphs; lithics, 2 sherds
2	80	Unknown		1 masonry room; lithics
3	10	Unknown		1 masonry room; lithics
4	50	Anasazi (?)		Terrace (50m^2); lithics
5	103	Anasazi (?) Historic (?)	early to mid P-IV	Terrace (108m^2); lithics, 2 sherds
6	240	Anasazi (?)		2 terraces (120m^2 and 25m^2); lithics
LA 13056/ 1	32	Lithic Unknown		Lithic scatter
2	120	Lithic Unknown		Lithic scatter, 3 sherds
LA 13057/ 1	9	Anasazi (?)	P-IV (?)	1 masonry room; lithics, 1 sherd
2	4	Anasazi	P-IV	1 masonry room; ceramics
LA 13058/ 1	6	Anasazi (?) Historic (?)	P-III (?)	1 masonry room 1 nonassociated modern hearth; lithics and ceramics
2	400	Anasazi	P-III (?), early P-IV	2-5 noncontiguous rooms; lithics and ceramics

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13059	1	150	Historic	post-1950	Cave; 2 masonry walls dividing it into 2 chambers; 1 recent hearth; watering trough; historic artifacts
LA 13060	1	200	Anasazi (?)		2 noncontiguous rooms; lithics
LA 13061	1	12	Lithic Unknown		Lithic scatter
LA 13062	1	350	Lithic Unknown		Firecracked rock-lithic scatter; 5 sherds
LA 13063	1	300	Lithic Unknown		1 possible hearth; lithics
LA 13064	1	45	Anasazi	early P-IV	2 noncontiguous rooms; lithics and ceramics
	2	13	Anasazi	early-mid P-IV (?)	1 masonry room; lithics and ceramics
	3	15m long	Anasazi (?)		1 trail; ceramics
	4	2	Anasazi (?)		1 isolated wall; ceramics
	5	150	Anasazi (?)		Terraces (150m^2)
LA 13065	1	n.d.	Lithic Unknown		1 possible hearth; firecracked rock, lithics
LA 13066	1	200	Anasazi (?)		1 masonry room; lithics; petroglyph
	2	120	Lithic Unknown		Lithic scatter
LA 13067	1	900	Anasazi (?)	early-mid P-IV	Cairn, trail; lithics and ceramics
LA 13068	1	1500	Anasazi (?)	early P-IV (?)	1 masonry room; terraces (250m^2–300m^2); lithics and ceramics
LA 13069	1	50	Historic (?)		1 isolated wall
LA 13070	1	300	Anasazi	early-mid P-IV	2 contiguous masonry rooms; terraces (50m^2); lithics
	2	80	Anasazi	early-mid P-IV	terraces (120m^2–?); lithics and ceramics
	3	4	Anasazi (?)		1 masonry room; lithics
LA 13071	1	25	Anasazi (?)		1 structure (?)
LA 13072	1	25	Anasazi (?)	early P-IV (?)	2 contiguous masonry rooms; lithics and ceramics
	2	10	Anasazi (?)	early P-IV (?)	2 contiguous masonry rooms: lithics and ceramics
	3	240	Anasazi	early P-IV	Terraces (240m^2); lithics and ceramics
LA 13073	1	70	Anasazi (?)		1 masonry room; lithics
LA 13074	1	525	Anasazi	early P-IV	1 masonry room; lithics and ceramics
LA 13075	1	36	Anasazi (?)		1 masonry room; lithics
LA 13076	1	8	Anasazi	early-mid P-IV	2 contiguous masonry rooms; petroglyph; lithics and ceramics
	2	4	Anasazi (?)	early P-IV (?)	1 masonry room; petroglyphs, lithics and ceramics
	3	12	Anasazi (?)	early P-IV (?)	2 contiguous masonry rooms; lithics and ceramics
LA 13077	1	3500	Anasazi (?)	early P-IV (?)	1 structure (?); terraces (250m^2); lithics and ceramics
LA 13078	1	400	Anasazi	early P-IV (?)	1 masonry room: terraces (208m^2); petroglyphs; lithics and ceramics
	2	6	Anasazi	early-mid P-IV	2 contiguous masonry rooms; lithics and ceramics
LA 13079	1	2250	Anasazi (?)	early P-IV (?)	Terraces (1245m^2); 1 sherd

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13080	1	3000	Anasazi	P-IV	Terraces (1464m^2); lithics and ceramics
LA 13081	1	90	Anasazi (?)		1-2 contiguous rooms; lithics
LA 13082	1	45	Anasazi	early P-IV	1 structure (?); lihtics and ceramics
LA 13083	1	25	Historic (?)		1 masonry structure, lithics
LA 13084	1	12	Anasazi (?)		1 masonry structure; petroglyphs
	2	456	Anasazi	early P-IV	3 rooms (2 contiguous); semicircular wall; terraces (300m2); lithics and ceramics
	3	64	Unknown		Semicircular wall (room?); lithics
LA 13085	1	80	Anasazi (?)		1 storage (?) room; lithics
LA 13086	1	36	Anasazi (?)		1 masonry room; lithics
	2	24	Anasazi	late P-III (?), early-mid P-IV	3 contiguous masonry rooms; lithics and ceramics
	3	912	Anasazi (?)	P-III (?)	2 contiguous masonry rooms; lithics and ceramics
	4	100	Anasazi (?)		Terraces (100m^2)
LA 13087	1	48	Anasazi (?)		1 masonry room
LA 13289	1	n.d.	Historic	20th century (?)	Trail and cairns
LA 13290	1	3000	Historic	post-1680	Terraces (300m^2); ceramics
LA 13291	1	6	Anasazi(?) Historic	P-IV(?) 18th century	1 masonry room; lithics and ceramics
	2	3	Historic (?)		1 storage (?) room
	3	4	Historic (?)		1 masonry room; lithics
	4	4	Historic (?)	18th century (?)	1 masonry room; ceramics
	5	575	Anasazi (?)	P-IV (?)	Terraces (220m^2); lithics and ceramics; petroglyphs
LA 13292	1	4500	Anasazi	P-IV	Terraces (3000m^2); lithics and ceramics
LA 13293	1	160	Anasazi	early-late P-IV	Terraces (80m^2); lithics and ceramics
LA 13294	1	1575	Anasazi	early-mid P-IV	1 masonry room; terraces (24m^2); petroglyphs; lithics and ceramics
LA 13295	1	200	Anasazi (?)		Terraces (200m^2); lithics
LA 13296	1	875	Anasazi (?)	early P-IV (?)	2 masonry rooms; possible associated terraces; petroglyphs; lithics and ceramics
LA 13297	1	25	Anasazi (?)		1 masonry room; lithics
LA 13298	1	120	Anasazi (?)		1 masonry room; firecracked rock, lithics
LA 13299	1	20	Anasazi (?)		1 structure (?)
LA 13300	1	25	Historic (?)	1600-1650 (?)	Lithic and ceramic scatter
	2	4	Anasazi (?)		1 masonry room; lithics
	3	120	Lithic Unknown		Firecracked rock-lithic scatter; 2 sherds
	4	105	Anasazi (?)		Terraces (105m^2)
LA 13301	1	1	Unknown		1 masonry room

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
	2	12	Unknown		1 masonry room
	3	10	Unknown		Isolated wall
	4	16	Unknown		1 masonry room
	5	6	Unknown		1 masonry room
LA 13302	1	16	Anasazi (?)		1 masonry room; lithics
LA 13303	1	8750	Anasazi (?)		Terraces (8750m^2)
LA 13304	1	700	Historic	post-1880 (?)	2 masonry, juniper and wire corrals; 1 hearth; historic artifacts
LA 13305	1	20	Unknown		1 masonry room
LA 13306	1	90	Historic	1900-1915 (?)	1 semisubterranean room; ovens; historic trash
LA 13307	1	240	Anasazi (?)	late P-III (?)	1 depression (possible kiva); lithics, 1 sherd
LA 13308	1	120	Lithic Unknown		1 hearth; firecracked rock, lithics, 1 sherd
	2	40	Lithic Unknown		1 hearth; firecracked rock, lithics
LA 13309	1	36	Historic	1880-1917 (?)	1 masonry room; historic artifacts
	2	104	Historic		1 juniper post corral
LA 13310	1	25	Anasazi (?)		1 structure (?); petroglyphs
LA 13311	1	200	Anasazi (?)		Terraces (200m^2)
LA 13312	1	16	Anasazi (?)		2 noncontiguous masonry rooms; lithics
	2	5	Anasazi (?)		1 masonry room
	3	n.d.	Anasazi (?)		Petroglyphs
LA 13313	1	4	Anasazi (?)		1 rubble mound; lithics
LA 13314	1	20	Unknown		1 storage structure or cist
LA 13315	1	25	Unknown		1 structure (?)
LA 13316	1	20	Anasazi	P-IV (?)	Rockshelter enclosing 1 chamber
LA 13317	1	30	Unknown		Rockshelter enclosing 1 chamber
LA 13318	1	150	Anasazi (?)	early P-IV(?)	3 contiguous masonry rooms; lithics; 2 sherds
LA 13319	1	4	Anasazi (?)		1 rubble mound (indeterminate number of rooms)
	2	2	Anasazi (?)		Isolated wall (possible structure)
	3	9	Anasazi (?)	P-IV (?)	1 structure (?); 1 sherd
LA 13320	1	96	Historic	post-1850 (?)	1 juniper post corral
LA 13321	1	36	Lithic Unknown		Firecracked rock-lithic scatter
LA 13322	1	12	Anasazi (?)		Terraces (12m^2)
LA 13323	1	9	Anasazi (?)	P-IV(?)	1 masonry room; lithics; 1 sherd
	2	6	Anasazi (?)		1 masonry room; lithics
LA 13324	1	250	Anasazi (?)	late P-III (?)-early P-IV (?)	1 masonry room; 1 possible depression; lithics; 2 sherds
LA 13325	1	48	Anasazi	early P-IV(?)	Isolated wall; lithics and ceramics

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13326	1	450	Anasazi (?)		2 depressions; 1 surface room; *lithics*
LA 13327	1	30	Anasazi (?)		Terraces ($30m^2$)
LA 13328	1	50	Anasazi (?)	early P-IV(?)	1 semisubterranean (?) room; ceramics
LA 13329	1	36	Anasazi (?)		1 depression; 1 surface structure; 1 sherd
LA 13330	1	700	Anasazi (?)		1 depression (pithouse?); lithics; 1 sherd
LA 13331	1	120	Anasazi (?)		2 depressions (pithouses?)
LA 13332	1	300	Anasazi (?)		2-3 depressions (pithouses?)
LA 13333	1	150	Anasazi (?)		2 depressions (pithouses?)
LA 13334	1	200	Anasazi (?)		3 depressions (pithouses?)
LA 13335	1	9	Anasazi (?)		1 depression (pithouse?)
LA 13336	1	80	Anasazi (?)		1 depression (pithouse?)
LA 13337	1	25	Unknown		Rubble (possible room)
LA 13338	1	240	Anasazi	late P-III (?), early-mid P-IV	2 hearths; lithic and ceramic scatter
LA 13339	1	8	Unknown		2 parallel basalt walls(?), possible room
LA 13340	1	300	Anasazi	late P-III (?), early P-IV	Rubble (1 room?); lithics and ceramics
LA 13341	1	1	Unknown		1 hearth
LA 13342	1	1050	Lithic Unknown		Concentration of andesite and basalt clasts *(possible hearth)*; lithics and ceramics
LA 13343	1	150	Lithic Unknown		Firecracked rock-lithic scatter
LA 13344	1	375	Lithic Unknown		2 hearths; lithic scatter; 1 sherd
LA 13345	1	20	Lithic Unknown		1 hearth; firecracked rock-lithic scatter
LA 13346	1	75	Anasazi (?)		Rubble (possible room)
LA 13347	1	36	Anasazi (?)	early P-IV (?)	1 masonry room; lithics and ceramics
LA 13348	1	12500	Lithic Unknown		3 hearths; lithic scatter
LA 13349	1	400	Lithic Unknown		Lithic scatter
LA 13350	1	7500	Lithic Unknown		Lithic scatter
LA 13351	1	5000	Lithic Unknown		Lithic scatter
LA 13352	1	450	Lithic Unknown		1 hearth; lithics
LA 13353	1	800	Lithic Unknown		1 hearth; lithics
LA 13354	1	24	Lithic Unknown		2 or more hearths; firecracked rock-lithic scatter
LA 13355	1	160	Anasazi (?)	late P-III (?)	1 masonry room; petroglyphs; 1 sherd
LA 13356	1	240	Anasazi	late P-III (?) early P-IV (?)	6 upright slab structures (rooms, cists or bins?)
LA 13357	1	36	Historic	early 20th century (?)	Possible corral; historic trash
	2	4	Historic (?)		1 structure (?); petroglyphs
LA 13358	1	3600	Lithic Unknown		Lithic scatter

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13359	1	150	Lithic Unknown		6 hearths; lithics and ceramics
	2	600	Historic	post-1950	5 hearths; firecracked rock; historic artifacts
LA 13360	1	28	Historic	post-1850	1 masonry and barbed wire corral
LA 13361	1	25	Unknown		1 masonry wall (possible corral)
LA 13362	1	200	Lithic Unknown		2 hearths; firecracked rock-lithic scatter
LA 13363	1	110	Historic (?)		Masonry and brush corral
	2	100	Historic (?)		Masonry and brush corral
LA 13364	1	25	Anasazi (?)		1 masonry structure
LA 13365	1	9	Anasazi	P-III (?) or P-IV (?)	1 masonry structure; lithics and ceramics
	2	36	Anasazi (?)		1-2 contiguous masonry rooms
LA 13366	1	25	Historic	post-1950	Historic artifact scatter
	2	n.d.	Historic	post-1950	Historic artifact scatter
LA 13367	1	6	Historic	post-1880 (?)	1 masonry room; historic artifacts
	2	9	Historic	post-1880 (?)	1 masonry corral (?); lithics and historic artifacts
LA 13368	1	12	Anasazi (?)	mid-P-IV (?)	1-3 contiguous masonry rooms; ceramics
	2	9	Unknown		2 parallel rock alignments, possible pen
LA 13369	1	25	Historic	post-1880 (?)	1 masonry room; historic artifacts
LA 13370	1	150	Unknown		2 noncontiguous masonry rooms
	2	28	Unknown		2-3 contiguous masonry rooms
	3	0.5	Unknown		1 isolated wall; 1 sherd
	4	16	Unknown		1-3 contiguous masonry rooms
	5	9	Unknown		1 masonry room
	6	3000	Anasazi (?)		Terraces (3000m^2); lithics
LA 13371	1	12	Anasazi (?)		1 rectangular masonry room
	2	150	Anasazi (?)		Terraces (150m^2)
LA 13372	1	9	Anasazi (?)		2 noncontiguous masonry rooms
	2	1	Anasazi (?)		1 masonry structure; petroglyphs
LA 13373	1	25	Anasazi (?)		1 masonry room; lithics
LA 13374	1	64	Anasazi	late P-III, mid-P-IV (?)	2 contiguous masonry rooms; lithics and ceramics
LA 13375	1	64	Anasazi (?)	late P-III (?)	Rubble mound (possibly 2 or more rooms) lithics and ceramics
LA 13376	1	100	Anasazi	mid P-IV	1 masonry room; lithics and ceramics
LA 13377	1	2500	Historic	post-1880 (?)	Historic artifact scatter
LA 13378	1	28	Anasazi (?)		1 depression (pithouse?)
	2	5	Anasazi (?)		1 depression (pithouse?)
	3	5	Anasazi (?)		1 depression (pithouse?); terraces (100m^2)
	4	5	Anasazi (?)		1 depression (pithouse?)

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
	5	5	Anasazi (?)		1 depression (pithouse?)
	6	5	Anasazi (?)		1 depression (pithouse?)
LA 13379	1	100	Anasazi (?)	mid P-IV (?)	1 masonry room; lithics and ceramics
LA 13380	1	100	Anasazi (?)		1 masonry room; petroglyphs; lithics
LA 13381	1	200	Historic (?)	18th century	2 contiguous masonry rooms; lithics and ceramics
LA 13382	1	25	Anasazi (?)		1 masonry room; 1 sherd
LA 13383	1	50	Anasazi (?)		Series of small terraces ($50m^2$)
	2	700	Lithic Unknown		Firecracked rock-lithic scatter
	3	11	Anasazi (?)		Isolated wall (retaining wall?)
	4	24	Unknown		Concentration of rocks (bin, hearth?); fire-cracked rock
LA 13384	1	700	Anasazi (?)		Dam and irrigation channel; 2 terraces ($40m^2$ and $60m^2$)
LA 13385	1	1000	Anasazi (?)		Rubble (1 room?); lithics
LA 13386	1	150	Anasazi (?)		1 masonry room; lithics
LA 13387	1	25	Anasazi (?)		Rubble mound (indeterminate number of rooms)
LA 13388	1	100	Anasazi (?)		1 masonry room; 1 depression; lithics
LA 13389	1	40	Anasazi (?)		1 masonry room; 1 small storage structure
LA 13390	1	32	Anasazi (?)	early-mid P-IV	2 noncontiguous masonry rooms; petroglyphs; ceramics
	2	16	Anasazi (?)	early-mid P-IV	2 contiguous masonry rooms; ceramics
LA 13391	1	250	Historic	18th century	7-9 small storage structures; 1-2 possible habitation structures; isolated wall or terrace; ceramics
LA 13392	1	35	Anasazi (?)		1 masonry room; lithics
	2	30	Anasazi (?)	early-mid P-IV	2 noncontiguous masonry rooms; petroglyphs
	3	9	Anasazi (?)		1 masonry room
LA 13393	1	100	Lithic Unknown		1 hearth; lithic scatter, 1 sherd
LA 13394	1	625	Lithic Unknown		Lithic scatter
LA 13395	1	50	Lithic Unknown		Lithic scatter
	2	60	Lithic Unknown		Lithic scatter
LA 13396	1	225	Anasazi	mid P-IV	1 hearth; lithic and ceramic scatter
LA 13397	1	100	Anasazi (?)		2 depressions (pithouses?); lithics
LA 13398	1	100	Anasazi (?)	P-IV (?)	Rubble mound (1-2 rooms?); lithics; 2 sherds
LA 13399	1	6	Unknown		Semicircular wall
LA 13400	1	25	Anasazi (?)		1 masonry structure; 2 sherds
	2	1500	Lithic Unknown		Firecracked rock-lithic scatter
LA 13401	1	150	Anasazi	P-IV	Lithic and ceramic scatter
LA 13402	1	2500	Anasazi (?)		1 masonry room; lithics

TABLE III.4.4 (con't)

SITE NO./ PROV. NO.		PROV. SIZE	PERIOD	PHASE OR DATES	DESCRIPTION
LA 13403	1	49	Anasazi (?)	P-IV (?)	1 masonry room; lithics and ceramics
LA 13404	1	100	Anasazi (?)	P-IV (?)	Rubble mound (indeterminate number of rooms); check dams; lithics; 2 sherds
LA 13405	1	900	Anasazi (?)		Rock alignment (retaining wall?)
LA 13406	1	300	Anasazi (?)	P-IV (?)	1 masonry structure; 1 concentration of rocks; lithics; 2 sherds
LA 13407	1	60	Unknown		2 piles of subangular basalt
LA 13408	1	450	Anasazi	early P-IV	3 noncontiguous masonry rooms; ceramics
	2	20	Lithic Unknown		Concentration of rocks; lithics
LA 13409	1	15	Anasazi (?) Historic (?)	late P-III (?)	1 masonry room; lithics and ceramics
	2	300	Anasazi (?)		3 sets of terraces (300m^2, 50m^2, 120m^2)
LA 13410	1	250	Anasazi	late P-III (?), P-IV (?)	2 contiguous masonry rooms; check dam; lithics and ceramics
LA 13446	1	96	Anasazi (?)		1 masonry room; lithics
LA 13447	1	4	Unknown		1 masonry room
LA 13448	1	12	Historic (?)		Subterranean masonry structure
	2	14	Historic (?)		2 noncontiguous masonry structures
	3	80	Historic (?)		1 masonry corral; historic artifacts
LA 13449	1	5	Anasazi (?)		1 masonry room; lithics
LA 13450	1	25	Anasazi (?)		2 noncontiguous masonry structures; lithics
LA 13451	1	9	Historic	1920 (?)	1 "A-frame" juniper structure with masonry fireplace; historic artifacts
	2	9	Historic	post 1920 (?)	Lean-to and associated rock concentration
	3	91	Historic	post 1920 (?)	Juniper corral
LA 13452	1	450	Anasazi (?)		Rockshelter, 1 chamber
LA 13453	1	40	Historic (?)		2 contiguous masonry rooms
	2	14	Historic (?)		1 masonry room; historic artifacts
	3	80	Anasazi (?)		Terraces (80m^2)
LA 13454	1	100	Anasazi (?)	early P-IV (?)	2 contiguous masonry rooms; lithics
LA 13455	1	6	Anasazi (?)		1 masonry room; lithics
	2	36	Anasazi	P-IV (?)	1 structure (?); lithics and ceramics
LA 13456	1	1800	Unknown		35 distinct piles of basalt
LA 13457	1	39	Anasazi (?)		1 masonry room; lithics
	2	120	Unknown		4 distinct clusters of rubble
	3	n.d.	Unknown		Petroglyph
LA 13458	1	900	Historic	post 1950	Juniper and barbed wire corral; historic artifacts

TABLE III.4.5

ARCHITECTURAL DESCRIPTION—PERMANENT POOL SURVEY

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS†	AREA††	HEIGHT†††	CONSTRUCTION MATERIAL
LA 5011	1	Room 1*	rectangiular	2.5 x 1.0	2.5	0.4	basalt clasts
		Room 2*	rectangiular	2.5 x 1.0	2.5	0.4	basalt clasts
		Room 3*	rectangiuar	1.8 x 1.8	3.2	0.4	basalt clasts
		*contiguous					
LA 5012	1	Room 1†	rectanglular	2.4 x 1.8	4.3	0.4	basalt clasts
		Room 2†	rectangular	1.7 x 1.3	2.2	0.4	basalt clasts
		Room 3†	rectanglular	2.0 x 1.7	3.4	0.4	basalt clasts
		†contiguous					
LA 5013	1	Room 1	rectangular	3.2 x 2.0	6.4	0.7	basalt clasts
LA 5014	1	12 - 17 rooms	rectangular	3.2 x 2.8 to 3.0 x 2.2	8.8 to 6.6	0.4	basalt clasts
LA 5015	1	Room 1	rectangular	2.5 x 2.5	6.3	0.4	basalt clasts and boulders
LA 9138	1	Room 1*	rectangular	4.5 x 2.5	11.3	n.d.	basalt clasts
		Room 2*	D-shaped	2.0 x 1.2	2.4	n.d.	basalt clasts
		*contiguous					
	2	Room 3†	rectangular	5.0 x 4.0	20.0	n.d.	basalt slabs and clasts
		Room 4†	rectanglular	4.0 x 3.0	12.0	n.d.	basalt slabs and clasts
		†contiguous					
	3	Room 5	rectangular	4.5 x 3.0	13.5	n.d.	basalt slabs, clasts and boulders
	4	Room 6	circular	2.0 diam.	3.1	n.d.	basalt boulders, slabs
	5	Room 7	rectangular	1.5 x 1.3	2.0	n.d.	basalt slabs and clasts
	6	Room 8††	rectanglular	4.0 x 3.0	12.0	n.d.	basalt slabs and clasts
		Room 9††	rectangular	3.4 x 3.2	10.9	n.d.	basalt boulders
		††contiguous					
LA 9139	1	Room 1*	rectangular	10.0 x 6.0	60.0	0.6	basalt slabs
		Room 2*	rectangular	6.0 x 4.0	24.0	0.6	basalt slabs
		*contiguous					
LA 10110	1	Room 1†	rectangular	5.0 x 5.0	25.0	0.3	basalt clasts
		Room 2†	rectangular?	5.0 x ?	n.d.	0.9	basalt clasts
		+contiguous					
	3	Wall	linear	100m long	n.d.	0.4	basalt clasts
LA 10111	1	Room 1	rectangular	6.0 x 5.0	30.0	0.3	basalt clasts
	3	Corral 1	rectangular	24.0 x 23.0	552.0	1.0	basalt clasts
		Corral 2	rectangular	8.0 x 5.0	40.0	n.d.	basalt clasts
	4	Corral 3	rectangular?	35.0 x 26.0	910.0	0.5	basalt clasts, boulders
	5	Corral 4	rectangular	26.0 x 24.0	624.0	0.8	basalt clasts?
LA 12160	1	Room 1	semicircular	5.0 x 2.5	12.5	0.5	basalt clasts

TABLE III.4.5 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 12161	1	Room 1	rectangular	2.5 x 2.5	6.25	0.6	unshaped basalt
LA 12437	1	Lean-to	n.d.	n.d.	n.d.	n.d.	juniper posts, planks
LA 12438	1	Room 1	rectangular	2.0 x 1.0	2.0	n.d.	tabular basalt clasts
LA 12440	1	Room 1	rectangular	2.5 x 2.0	5.0	n.d.	slabs and cobbles
		Room 2	oval	2.0 x 1.5	3,0	n,d,	slabs and cobbles
LA 12443	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	tabular basalt clasts and cobbles
LA 12447	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	unshaped tabular basalt clasts
LA 12449	1	Room 1	rectangular	3.4 x 3.1	10.5	n.d.	juniper posts, angular elements
		Corral 1	semicircular	9.0 x 9.0	81.0	n.d.	juniper and brush
		Corral 2	semicircular	9.0 x 7.0	63.0	n.d.	juniper and brush
LA 12451	1	Room 1†	rectangular	2.0 x 1.6	3.8	n.d.	basalt clasts
		Room 2†	rectangular	2.3 x 1.6	3.7	n.d.	basalt clasts
		†contiguous					
LA 12452	1	Rubble (1-4 rooms)	rectangular	4.0 x 1.0	4.0	0.5	unshaped tabular basalt clasts
.	2	Room 1	square	1.0 x 1.0	1.0	0.5	unshaped tabular basalt clasts
LA 12453	1	Room 1	rectangular	11.0 x 5.0	55.0	2.0	simple coursed, mortared tabular basalt
LA 12454	1	Room 1*	rectangular	2.1 x 1.7	3.6	0.1	clasts
		Room 2*	rectangular	2.2 x 1.7	3.7	0.1	clasts
		*contiguous					
LA 12457	1	Rockshelter with wall	"rectangular"	4.0 x 3.0	12.0	1.8	natural shelter, basalt clast wall
LA 12459	2	Corral	rectangular	20.0 x 2.0	40.0	n.d.	brush corral
LA 12461	1	Rubble	n.d.	10.0 diam.	n.d.	n.d.	unshaped basalt clasts
	2	Rubble	n.d.	10.0 diam.	n.d.	n.d.	basalt clasts
LA 12462	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	upright slabs
LA 12464	1	Room 1	rectangular	1.5 x 1.0	1.5	1.0	basalt clasts and boulders
LA 12465	2	Room 1†	rectangular	3.2 x 1.8	5.8	0.6	basalt clasts
		Room 2†	square	2.6 x 2.6	6.8	0.6	basalt clasts
		†contiguous					
	3	Room 3	semicircular	3.2 x 1.6	5.1	0.8	basalt clasts
	4	Room 4	L-shaped	3.1 x 1.4	4.3	1.1	basalt clasts
		Walls	"square"	5.0 x 5.0	25.0	n.d.	basalt clasts
	5	Room 5††	L-shaped	2.0 x 2.0	4.0	0.5	basalt clasts
		Room 6††	semicircular	1.8 x 1.1	1.9	0.5	basalt
		††contiguous					
	6	Corral	semicircular	9.0 x 4.0	36.0	0.5	basalt clasts
		walls	L-shaped	5.0 x 4.0	n.d.	n.d.	basalt clasts
	8	Room 7	D-shaped	1.0 x 0.8	0.8	0.5	basalt clasts
	9	Room 8	square	6.0 x 6.0	36.0	0.5	basalt cobbles

TABLE III.4.5 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 12466	1	Room 1	oval	3.0 x 2.0	6.0	n.d.	basalt clasts
	2	Room 2	rectangular	4.0 x 2.0	8.0	n.d.	boulders and basalt clasts
	3	Rubble	n.d.	2.0 diam.	n.d.	n.d.	tabular basalt clasts
LA 12467	1	Structure 1	semicircular	15.0 x 13.0	195.0	1.3	boulders and clasts
	2	Structure 2	semicircular	8.0 x 6.0	48.0	n.d.	boulders and clasts
LA 12469	1	Room 1	rectangular	1.5 x 1.0	1.5	0.4	boulder and basalt clasts
LA 12470	1	Structure 1	semicircular	1.2 x 1.2	1.4	0.7	basalt clasts and boulder
LA 12471	1	Room 1*	circular	1.5 diam.	1.8	0.7	basalt clasts and cobbles
		Room 2*	circular	2.0 diam.	3.1	0.7	basalt clasts and cobbles
		*contiguous					
LA 12472	5	Wall	linear	3.0 x ?	n.d.	n.d.	boulders, basalt rubble
	7	Wall	linear	8.0 x ?	n.d.	n.d.	n.d.
LA 12474	1	Wall	semicircular	3.0 x ?	n.d.	0.5	basalt clasts and boulder
		Wall	n.d.	1.6 x ?	n.d.	1.2	boulders, basalt clasts
		Structure?	semicircular	2.5 x 1.2	3.0	n.d.	wood poles
LA 12477	3	Tent base	n.d.	n.d.	n.d.	n.d.	n.d.
LA 12480	1	Room 1†	rectangular	2.0 x 1.5	3.0	n.d.	basalt elements
		Room 2†	rectangular	2.0 x 1.5	3.0	n.d.	basalt elements
		Room 3†	rectangular	2.0 x 1.5	3.0	n.d.	basalt elements
		†contiguous					
LA 12485	1	Structure 1	U-shaped	4.5 x 3.5	15.8	0.5	basalt clasts
LA 12488	1	Structure 1	rectangular	4.0 x 2.0	8.0	1.0	basalt clasts
LA 12489	1	Structure 1	semicircular	1.0 x ?	n.d.	1.0?	boulders and basalt clasts
LA 12492	1	Room 1	rectangular	2.5 x 1.5	3.8	n.d.	unshaped tabular basalt clasts, boulder and mortar
LA 12497	1	Room 1	rectangular	2.0 x 1.5	3.0	0.8	clasts and boulder
LA 12498	1	Room 1	square	4.0 x 4.0	16.0	n.d.	basalt clasts
LA 12501	1	Room 1	rectangular	3.0 x 2.5	7.5	n.d.	basalt clasts and boulders
LA 12504	1	Corral 1	semicircular	14.0 x 7.0	98.0	n.d.	basalt clasts and talus
		Corral 2	rectangular	23.0 x 10.0	230.0	n.d.	basalt clasts and talus
		Corral 3	oval	28.0 x 18.0	504.0	n.d.	basalt clasts and talus
LA 12505	1	Structure 1	square	5.0 x 5.0	25.0	0.3	basalt boulders and clasts
LA 12506	1	Wall	linear	40.0 x ?	n.d.	n.d.	basalt clasts
LA 12507	1	Room 1	rectangular	5.0 x 3.0	15.0	0.4	basalt clasts
LA 12508	1	Room 1	circular	3.0 diam.	7.1	1.5	basalt clasts, adobe mortar
		Corral 1	rectangular?	18.0 x 12.0	96.0	n.d.	basalt clasts
		Corral 2	rectangular?	12.0 x 8.0	96.0	n.d.	basalt clasts
LA 12509	1	Room 1	oval	2.0 x 1.5	3.0	n.d.	basalt clasts and talus elements

TABLE III.4.5 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 12511	1	Room 1†	square	2.0 x 2.0	4.0	0.3	basalt
		Room 2†	square	2.0 x 2.0	4.0	0.3	basalt
		Room 3†	square	2.0 x 2.0	4.0	0.3	basalt
		†contiguous					
LA 12512	1	Room 1	rectangular	2.0 x 1.5	3.0	0.9	unshaped tabular basalt clasts
LA 12513	1	Room 1	square	3.0 x 3.0	9.0	1.0	unshaped basalt clasts
LA 12514	1	Room 1*	square	2.0 x 2.0	4.0	n.d.	basalt
		Room 2*	rectangular	2.5 x 2.0	5.0	n.d.	basalt
		*contiguous					
	2	Room 3	n.d.	n.d.	n.d.	n.d.	n.d.
		Room 4	n.d.	n.d.	n.d.	n.d.	n.d.
LA 12515	1	Depression possible pithouse	oval	6.0 x 4.0	24.0	n.d.	n.d.
LA 12516	1	Room 1	circular	3.0 diam.	7.1	n.d.	unshaped basalt elements
LA 12517	1	Room 1	circular	2.1 diam.	3.5	0.5	basalt clasts
	4	wall	linear	2.5 x 0.3	—	0.3	basalt clasts
LA 12518	1	Room 1	square	3.0 x 3.0	9.0	0.4	basalt clasts
LA 12519	1	Room 1	square	2.0 x 2.0	4.0	0.3	unshaped basalt elements
LA 12520	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	upright unshaped basalt clasts
LA 12522	1	Room 1†	rectangular	2.1 x.1.5	3.0	0.3	unshaped basalt clasts and cobbles
		Room 2†	square	2.0 x 2.0	4.0	0.3	unshaped basalt clasts and cobbles
		†contiguous					
		Depression possible pithouse	circular	5.0 diam.	19.6	n.d.	n.d.
LA 12523	1	Corral	circular	6.0 diam.	28.3	0.9	basalt cobbles, clasts and boulders
LA 12524	1	Room 1	oval	2.9 x 2.5	7.3	1.0	basalt clasts
		Room 2	rectangular	1.2 x 0.3	0.4	1.0	basalt clasts and boulders
		Structure?	rectangular	3.0 x 1.5	4.5	0.5	basalt clasts
		Structure?	circular	3.0 diam.	7.1	0.5	basalt clasts
		Room 3	oval	3.0 x 2.0	6.0	1.5	unshaped basalt clasts
LA 12525	1	Room 1	rectangulr	3.0 x 2.0	6.0	0.4	boulder, basalt clasts
		Room 2	square	1.0 x 1.0	1.0	0.6	boulders, basalt clasts
		Wall	semicircular	60.0+	—	0.5	basalt clasts

† interior dimensions are measured in meters

†† area is measured in sq. meters

††† maximum standing height

TABLE III.4.6

ARCHITECTURAL DESCRIPTION—FLOOD CONTROL POOL SURVEY

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 5017	1	Room 1	rectangular	6.0 x 5.0	30.0	0.3	basalt clasts
LA 10114	1	Room 1	square	3.0 x 3.0	9.0	1.5	basalt clasts and boulder
LA 12158	1	Room 1	semicircular	2.0 x 2.0	4.0	0.6	basalt clasts and boulders
		Room 2	semicircular	2.0 x 2.0	4.0	0.6	basalt clasts and boulders
		Room 3	rectangular	3.0 x 2.0	6.0	0.6	basalt clasts and boulders
		Room 4	rectangular	3.0 x 2.0	6.0	0.6	basalt clasts and boulders
LA 12162	1	Room 1	rectangular	3.0 x 2.5	7.5	0.4	basalt clasts, isolated talus element
LA 12163	2	Room 1	square	3.0 x 3.0	9.0	n.d.	basalt clasts and talus
		Wall	linear	12.0 x 0.5	—	n.d.	basalt clasts and talus
	4	Room 2†	square	3.0 x 3.0	9.0	n.d.	basalt clasts and talus
		Room 3† †contiguous	square	3.0 x 3.0	9.0	1.0	basalt clasts and talus
		Room 4	semicircular	2.0 x 2.0	4.0	n.d.	basalt clasts and talus
		Room 5	semicurcular	2.0 x 2.0	4.0	n.d.	basalt clasts and talus
		Room 6††	square	2.0 x 2.0	4.0	n.d.	basalt clasts and tlaus
		Room 7†† ††contiguous	semicircular	2.0 x 2.0	4.0	n.d.	basalt clasts and talus
		Room 8	circular	2.0 diam.	6.3	n.d.	basalt clasts and talus
		Room 9	semicircular	2.0 x 2.0	4.0	n.d.	basalt clasts and talus
		Room 10	rectangular	3.0 x .20	6.0	n.d.	basalt clasts and talus
LA 12172	1	Room 1	rectangular	1.9 x 1.8	3.4	n.d.	andesite, basalt, tuff, cobbles
LA 12510	1	Room 1	rectangular	1.5 x 1.0	1.5	n.d.	basalt clasts
		Room 2	square	2.0 x 2.0	4.0	n.d.	basalt clasts
LA 12579	1	200 to 400 rooms †††	square	2.0 x 2.0 (ave.)	4.0	n.d.	andesite, basalt and pumice blocks
LA 13014	1	Room 1	square	2.0 x 2.0	4.0	n.d.	unshaped river cobbles
LA 13015	1	Room 1*	square?	2.5 x 2.5?	6.3?	n.d.	unshaped river cobbles & basalt clasts
		Room 2*	square	2.5 x 2.5	6.3	n.d.	unshaped river cobbles & basalt clasts
		Room 3* * contiguous	square?	2.3 x 2.3	n.d.	n.d.	unshaped river cobbles & basalt clasts
LA 13018	1	Room 1**	rectangular	3.0 x 2.0	6.0	n.d.	river cobbles & basalt clasts
		Room 2** ** contiguous	square	2.0 x 2.0	4.0	n.d.	river cobbles & basalt clasts
LA 13021	1	Room 1	square	2.0 x 2.0	4.0	n.d.	cobble & basalt footings for adobe wall
LA 13024	1	Room 1†	rectangular	3.0 x 2.5	7.5	0.8	andesite & basalt cobbles
		Room 2† † contiguous	square	1.0 x 1.0	1.0	0.8	andesite & basalt cobbles
LA 13030	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	andesite & basalt clasts
	2	Room 2	rectangular	3.0 x 1.5	4.5	n.d.	cobbles

††† LA 12579 is made up of 4 roomblocks arranged rectilinearly with exterior dimensions of 60m x 40m. These roomblocks enclose a single plaza. The roomblocks average 4 rooms in width. The height is estimated at two stories. A minimum of 2 kivas (6.0m diam.) were noted within the plaza with 3 additional kivas outside the plaza.

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13032	1	Cist?	rectangular	0.5 x 0.3	0.2	n.d.	granitic stone
LA 13033	1	Room 1	square	4.0 x 4.0	16.0	n.d.	unshaped basalt clasts
		Oven?	subrectangular	1.5 x 1.5	1.9	0.4	basalt clasts
		Oven?	subrectangular	1.0 x 0.9	0.9	0.3	boulder and basalt
LA 13034	1	Room 1	subrectangular	2.5 x 2.2	2.8	0.4	basalt talus & boulders
	2	Room 2	subrectangular	2.0 x 2.0	4.0	0.6	basalt clasts and boulders
LA 13042	1	Structure?	n.d.	n.d.	n.d.	n.d.	n.d.
LA 13044	1	Room 1	rectangular	3.0 x 2.0	6.0	n.d.	basalt clasts
LA 13045	1	Structure?	square	2.0 x 2.0	4.0	0.3	tabular basalt
		2 perpendicular walls	T-shaped	165 & 160	—	0.8	basalt talus, boulders, cobbles
LA 13047	1	Room 1†	rectangular	4.0 x 3.5	14.0	n.d.	basalt clasts & boulders
		Room 2†	rectangular	3.5 x 3.0	10.5	n.d.	basalt clasts & boulders
		Room 3†	square	3.5 x 3.5	12.3	n.d.	basalt clasts & boulders
		Room 4†	square	3.5 x 3.5	12.3	n.d.	basalt clasts & boulders
		walls †contiguous					
		Room 5	rectangular	4.0 x 2.0	8.0	n.d.	basalt clasts & boulders
LA 13049	1	Room 1	rectangular	3.0 x 2.5	7.5	n.d.	basalt clasts
	2	Room 2	circular	0.6 diam.	0.3	0.8	basalt clasts
LA 13050	1	Room 1*	rectangular	2.5 x 2.0	5.0	0.4	basalt clasts
		Room 2* * contiguous	rectangular	3.0 x 2.0	6.0	0.4	basalt clasts
	2	Oven?	semicircular	1.0 x 1.0	1.0	0.5	basalt
	4	check dam	linear	2.0 x 0.3	—	n.d.	basalt clasts
		check dam	linear	2.0 x 0.3	—	n.d.	basalt clasts
LA 13054	1	Room 1	square	1.5 x 1.5	2.3	n.d.	tabular basalt
		Room 2	rectangular	2.0 x 1.8	3.6	n.d.	basalt slabs
LA 13055	1	Room 1	rectangular	3.0 x 2.0	6.0	1.6	basalt boulders, clasts (semishelter)
	2	Room 2	subrectangular	4.0 x 3.0	12.0	0.8	basalt boulders, clasts (semishelter)
	3	Room 3	rectangular	4.5 x 1.8	6.1	n.d.	n.d.
LA 13057	1	Room 1	rectangular	4.0 x 3.0	12.0	0.3	basalt clasts
	2	Room 2	square	2.0 x 2.0	4.0	1.0	basalt clasts, red cinders
LA 13058	1	Room 1	rectangular	2.5 x 2.0	5.0	1.0	basalt boulder, clasts (semishelter)
	2	Room 2	rectangular	3.0 x 2.0	6.0	n.d.	basalt boulders and clasts
		Room 3	rectangular	2.0 x 1.5	3.0	n.d.	basalt boulders and clasts
		Room 4	ephemeral	n.d.	n.d.	n.d.	basalt boulders and clasts
		Room 5	ephemeral	n.d.	n.d.	n.d.	basalt boulders and clasts
LA 13059	1	Room 1	semicircular	2.5 x 2.0	5.0	1.5	natural cave, basalt wall
		Room 2	subrectangular	3.0 x 2.0	6.0	1.5	natural cave, basalt wall
LA 13060	1	Room 1	rectangular	1.2 x 1.5	1.8	n.d.	basalt clasts
		Rubble	indeterminate number of rooms	15.0 x 7.0	105.0	n.d.	basalt clasts
LA 13064	1	Room 1	rectangular	2.5 x 2.0	5.0	n.d.	basalt boulders, clasts (overhang)
		Room 2	rectangular	2.0 x 1.3	2.6	n.d.	basalt boulders, clasts
	2	Room 3	subrectangular	2.0 x 2.0	4.0	0.8	basalt boulders, clasts

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13066	1	Room 1	rectangular	2.8 x 1.6	4.5	1.0	basalt clasts
LA 13067	1	Cairn	circular	0.5 diam.	—	1.0	basalt clasts
LA 13068	1	Room 1	rectangular	3.0 x 2.4	7.2	1.0	basalt clasts
LA 13069	1	Wall	linear	50.0 x 0.5	—	1.0	basalt clasts
LA 13070	1	Room 1†	rectangular	2.0 x 1.6	3.2	n.d.	basalt clasts
		Room 2†	rectangular	1.7 x 1.5	2.6	n.d.	basalt clasts
		† contiguous					
	3	Room 3	rectangular	2.0 x 1.0	2.0	0.4	basalt clasts
LA 13072	1	Room 1*	pentagonal	1.9 x 1.9	2.8	0.9	basalt clasts
		Room 2*	oval	1.8 x 1.4	2.5	0.9	basalt clasts
		* contiguous					
	2	Room 3**	rectangular	1.7 x 1.4	2.4	n.d.	basalt clasts
		Room 4**	rectangular	1.7 x 1.4	2.4	n.d.	basalt clasts
		** contiguous					
LA 13073	1	Room 1	rectangular	2.5 x 2.0	5.0	0.4	basalt clasts and boulders
LA 13074	1	Room 1	rectangular	2.5 x 2.0	5.0	0.5	basalt clasts
LA 13075	1	Room 1	circular	2.0 diam.	3.1	0.8	basalt clasts and boulders
LA 13076	1	Room 1†	rectangular	2.0 x 1.8	3.6	0.8	basalt clasts and boulder
		Room 2†	rectangular	2.2 x 2.0	4.4	0.8	basalt clasts and boulder
		† contiguous					
	2	Room 3	rectangular	2.5 x 2.0	5.0	0.8	basalt clasts
	3	Room 4††	rectangular	2.5 x 2.0	5.0	n.d.	basalt clasts
		Room 5††	rectangular	2.5 x 2.0	5.0	n.d.	basalt clasts
		†† contiguous					
LA 13077	1	Structure?	square	2.0 x 2.0	4.0	n.d.	basalt clasts
LA 13078	1	Room 1	rectangular	3.0 x 2.0	6.0	1.0	basalt clasts and boulder
	2	Room 2*	square	1.0 x 1.0	1.0	n.d.	basalt clasts
		Room 3*	square	2.0 x 2.0	4.0	n.d.	basalt clasts
		* contiguous					
LA 13081	1	Room 1**	rectangular	5.0 x 2.5	12.5	0.6	basalt, adobe, cobbles
		Room 2**	ephemeral	n.d.	n.d.	n.d.	n.d.
		** contiguous					
LA 13082	1	Structure?	square	4.0 x 4.0	16.0	0.6	basalt clasts and boulder
LA 13083	1	Room 1	subrectangular	3.5 x 2.5	8.8	0.9	basalt clasts and talus
LA 13084	1	Room 1	oval	3.5 x 2.5	8.8	0.9	basalt clasts and talus
	2	Room 2†	subrectangular	2.7 x 1.8	4.9	n.d.	basalt (nonlocal?), boulder
		Room 3†	semicircular	2.6 diam.	5.3	0.9	basalt
		† contiguous					
		Room 4	rectangular	1.8 x 1.7	3.1	n.d.	basalt clasts, boulders
		Wall	semicircular	1.8 x 0.5	—	1.0	basalt
	3	Room 5	semicirucular	1.8 x 1.8	3.2	0.4	basalt clasts
LA 13085	1	Room 1	square	1.0 x 1.0	1.0	0.4	basalt clasts

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13086	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	basalt
	2	Room 2†	rectangular	2.0 x 1.7	3.4	1.6	basalt boulder and clasts
		Room 3†	rectangular	2.0 x 2.0	4.0	1.6	basalt boulder and clasts
		Room 4†	rectangular	2.0 x 2.0	4.0	n.d.	basalt clasts
		† contiguous					
	3	Room 5††	rectangular	4.0 x 2.5	10.0	n.d.	basalt
		Room 6††	rectangular	4.0 x 2.0	8.0	n.d.	basalt
		†† contiguous					
LA 13294	1	Room 1	rectangular	2.1 x 1.9	3.9	0.5	basalt clasts, boulder with vertical foundation
LA 13087	1	Room 1	square	2.0 x 2.0	4.0	0.3	Puye gravels
LA 13291	1	Room 1	triangular	3.0 x 2.0	3.0	0.5	basalt clasts and boulders
	2	Room 2	semicurcular	2.8 x 1.0	2.8	n.d.	basalt clasts and boulders
	3	Room 3	square	1.2 x 1.2	1.4	n.d.	basalt clasts
	4	Room 4	square	2.1 x 1.3	2.7	n.d.	basalt clasts and boulder
LA 13296	1	Room 1	square	2.0 x 2.0	4.0	0.5	basalt clasts and boulder
		Room 2	rectangiular	4.0 x 1.5	6.0	1.0	basalt boulder (with natural over-hang), clasts
LA 13298	1	Room 1	rectangular	3.0 x 2.7	8.2	0.4	basalt clasts
LA 13299	1	Structure?	U-shaped	2.0 x 2.0	4.0?	n.d.	basalt clasts
LA 13300	2	Room 1	rectangualr	1.5 x 1.0	1.5	n.d.	basalt clasts
LA 13301	1	Room 1	square	1.0 x 1.0	1.0	0.4	basalt clasts
	2	Room 2	oval	4.0 x 2.5	6.0	0.5	basalt clasts
	3	Retaining wall?	linear	10.0 x 1.0	—	n.d.	basalt clasts
	4	Structure?	semicircular	3.0 x 2.0	6.0?	0.8	basalt clasts
	5	Structure?	subrectangular	2.2 x 1.8	3.2	0.7	basalt clasts
LA 13302	1	Room 1	rectangular	2.0 x 1.8	3.6	0.4	volcanic and quartzite cobbles
LA 13304	1	Corral 1	circular	13.0 diam.	132.7	0.6	juniper posts, basalt clasts and steel and copper baling wire
		Corral 2	circular	10.0 diam.	78.5	n.d.	juniper poles, brush and wire
LA 13305	1	Room 1	oval	1.9 diam.?	5.7	0.5	volcanic clasts
LA 13306	1	Room 1	rectantular	3.0 x 2.3	6.9	1.4	1 x 4 inch lumber & basalt
		Oven	U-shaped	1.5 x 1.3	1.9	n.d.	basalt clasts
LA 13307	1	Depression (kiva?)	circular	5.0 diam.	19.6	n.d.	basalt clasts
LA 13309	1	Room 1	rectangular	4.0 x 3.0	12.0	0.5	vesicular basalt and andesite
	2	Corral	rectangular	12.0 x 8.0	96.0	2.0	upright, trimmed juniper posts
LA 13310	1	Structure?	triangular	1.8 x 1.3	1.2	n.d.	boulders and clasts
LA 13312	1	Room 1	circular	1.3 diam.	1.3	n.d.	basalt clasts and boulder
		Room 2	circular	1.3 diam.	1.3	0.4	basalt clasts and boulder
	2	Room 3	rectangular	1.8 x 1.0	1.8	0.6	basalt clasts and boulder
LA 13313	1	Structure?	rectangular	2.0 x 1.8	3.6	0.3	basalt clasts and boulder
LA 13314	1	Room/cist?	rectangular	2.3 x 0.7	1.6	0.8	cliff face and basalt clasts
LA 13315	1	Structure?	L-shaped	3.0 x 1.2	3.6	0.5	basalt clasts
LA 13316	1	Room 1	rectangular	10.0 x 2.0	20.0	3.0	natural cave

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13317	1	Room 1	rectangular	10.0 x 3.0	30.0	n.d.	natural cave
LA 13318	1	Room 1*	square	1.5 x 1.5	2.3	n.d.	basalt, andesite & cliff face
		Room 2*	rectangular	2.0 x 1.8	3.5	0.5	basalt, andesite & cliff face
		Room 3* * contiguous	rectangular	3.0 x 2.5	7.5	0.5	basalt, andesite & cliff face
LA 13319	1	Structure?	L-shaped	1.7 x 1.7	2.9	0.5	basalt and andesite clasts
	2	Wall	U-shaped	1.8 x 0.5	0.9	0.4	basalt clasts connecting 2 juniper posts
	3	Structure?	L-shaped	3.0 x 1.2	3.6	0.7	basalt clasts
LA 13320	1	Corral	rectangular	12.0 x 8.0	96.0	1.6	ax-cut juniper logs
LA 13323	1	Room 1	square	2.0 x 2.0	4.0	n.d.	basalt and andesite clasts
	2	Room 2	rectangular	1.5 x 1.0	1.5	n.d.	basalt clasts
LA 13324	1	Room 1	rectangular	1.5 x 1.0	1.5	n.d.	basalt clasts
		Depression	circular	4.0 diam.	12.6	n.d.	n.d.
LA 13325	1	Wall	linear	1.3 x 0.4	—	1.3	basalt clasts
LA 13326	1	Room 1	square	1.5 x 1.5	2.3	n.d.	basalt clasts
		Depression 1	oval	4.0 x 3.5	14.0	n.d.	n.d.
		Depression 2	circular	2.0 diam.	3.1	n.d.	n.d.
LA 13328	1	Room 1	square	2.0 x 2.0	4.0	n.d.	basalt clasts
LA 13329	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	andesite cobbles and basalt clasts
		Depression	circular	3.0 diam.	7.1	n.d.	n.d.
LA 13330	1	Depression	circular	3.0 diam.	7.1	n.d.	n.d.
LA 13331	1	Depression 1	circular	3.0 diam.	7.1	n.d.	n.d.
		Depression 2	circular	2.0 diam.	3.1	n.d.	n.d.
LA 13332	1	Depression 1	oval	3.0 x 2.0	6.0	n.d.	n.d.
		Depression 2	circular	5.0 diam.	19.6	n.d.	n.d.
		Depression 3	circular	4.0 diam.	12.6	n.d.	n.d.
		Wall?	linear	n.d.	n.d.	n.d.	basalt clasts
LA 13333	1	Depression 1	circular	1.9 diam.	2.8	n.d.	n.d.
		Depression 2	circular	2.3 diam.	4.2	n.d.	n.d.
LA 13334	1	Depression 1	circular	1.5 diam.	2.4	n.d.	n.d.
		Depression 2	circular	2.0 diam.	3.1	n.d.	n.d.
		Derpession 3	circular	3.0 diam.	7.1	n.d.	n.d.
LA 13335	1	Depression 1	circular	2.0 diam.	3.1	n.d.	n.d.
LA 13336	1	Depression 1	circular	2.0 diam.	3.1	n.d.	n.d.
		Wall?	L-shaped	1.5 x 1.3	1.9	n.d.	basalt clasts
LA 13337	1	Room?	square	1.0 x 1.0	1.0	n.d.	basalt clasts
LA 13339	1	2 parallel walls (room?)	rectangular?	1.4 x 1.4?	2.0	n.d.	basalt clasts
LA 13340	1	Room 1	square	2.5 x 2.5	6.3	n.d.	basalt clasts
LA 13346	1	Structure?	square	4.0 x 4.0	16.0	n.d.	basalt clasts
		Structure?	rectangular	3.0 x 2.0	6.0	n.d.	basalt clasts
LA 13347	1	Room 1	rectangular	1.8 x 1.5	2.7	0.6	basalt clasts
LA 13355	1	Room 1	rectangular	1.5 x 1.3	1.9	1.0	basalt clasts and boulders

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13356	1	Slab feature 1 (room?)	rectangular	2.1 x 2.0	4.2	n.d.	basalt clasts
		Slab feature 2	square	3.0 x 3.0	9.0	n.d.	basalt clasts
		Slab feature 3	square	1.7 x 1.7	2.9	n.d.	basalt clasts
		Slab feature 4	n.d.	2.0 x ?	n.d.	n.d.	basalt clasts
		Slab feature 5	square	3.0 x 3.0	9.0	n.d.	basalt clasts
		Slab feature 6	square	1.5 x 1.5	2.3	n.d.	basalt clasts
LA 13357	1	Corral?	S-shaped	6.0 x ?	—	0.6	basalt clasts
	2	Room?	subrectangular	1.9 x 1.3	2.5	n.d.	clasts and boulders
LA 13360	1	Corral	oval	7.0 x 4.0	28.0	1.1	volcanic rocks and barbed wire
LA 13361	1	Wall (corral?)	L-shaped	7.0 x 5.0	35.0	0.7	andesite and basalt
LA 13363	1	Corral?	rectangular	11.0 x 10.0	110.0	0.4	basalt clasts, brush & juniper posts
	2	Corral?	circular	10.0 diam.	78.5	4.0	stone foundation, vertical posts
LA 13364	1	Room 1	oval	3.0 x 2.5	7.5	0.5	basalt clasts
LA 13365	1	Room 1	subrectangular	1.6 x 1.2	1.9	0.6	basalt clasts
	2	Room 2†	rectangular	2.5 x 1.7	4.3	n.d.	basalt clasts
		Room 3†	ephemeral	2.5 x 0.8	2.0	n.d.	basalt clasts
		† contiguous					
LA 13367	1	Room 1	rectangular	2.4 x 1.9	4.6	0.5	basalt clasts
	2	Corral?	rectangular	3.0 x 2.6	7.8	n.d.	basalt clasts and boulders
LA 13368	1	Room 2	rectangular	2.1 x 1.6	3.4	0.4	basalt clasts
	2	2 parallel walls	square	3.0 & 3.0	—	n.d.	n.d.
LA 13369	1	Room 1	rectangular	2.5 x 2.0	5.0	0.8	basalt clasts
LA 13370	1	Room 1	rectangular	3.0 x 2.0	6.0	0.4	basalt clasts
		Room 2	subrectangular	4.0 x 3.0	12.0	n.d.	basalt clasts
	2	Room 3*	square	2.0 x 2.0	4.0	0.8	basalt
		Room 4*	rectangular	3.0 x 2.0	6.0	n.d.	basalt
		Room 5*	ephemeral	2.3 x ?	—	n.d.	basalt
		* contiguous					
	3	Wall	linear	2.0 x ?	—	1.3	basalt boulders and clasts
	4	Room 6	rectangular	3.0 x 2.0	6.0	n.d.	basalt clasts
		Room 7	ephemeral	4.0 x 4.0	16.0?	n.d.	basalt clasts
	5	Room 8	square	2.5 x 2.5	6.3	1.0?	basalt clasts and boulders
LA 13371	1	Room 1	rectangular	3.5 x 2.2	7.7	1.0	basalt clasts and boulder
LA 13372	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	basalt clasts and boulder
		Room 2	triangular	2.0 x 2.0	2.0?	n.d.	basalt clasts and boulder
	2	Room 3	semicircular	2.0 x 1.0	2.0	0.7	basalt clasts and boulders
LA 13373	1	Room 1	rectangular	1.6 x 1.0	1.6	n.d.	basalt clasts and boulders
LA 13374	1	Room 1†	rectangular	1.8 x 1.3	2.3	n.d.	basalt clasts
		Room 2†	circular	1.8 diam.	2.5	n.d.	basalt clasts
		† contiguous					

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13375	1	Room 1††	rectangular	2.5 x 2.0	5.0	n.d.	andesite, basalt and quartz cobbles
		Room 2††	square	1.5 x 1.5?	2.3?	n.d.	andesite, basalt and quartz cobbles
		†† contiguous					
LA 13376	1	Room 1	rectangular	1.5 x 1.1	1.7	n.d.	basalt and quartzite cobbles
LA 13378	1	Depression 1	circular	5.0 diam.	19.6	n.d.	n.d.
	2	Depression 2	circular	7.0 diam.	38.4	n.d.	n.d.
	3	Depression 3	circular	3.0 diam.	7.1	n.d.	n.d.
	4	Depression 4	circular	3.0 diam.	7.1	n.d.	n.d.
	5	Depression 5	circular	3.0 diam.	7.1	n.d.	n.d.
	6	Depression 6	circular	3.0 diam.	7.1	n.d.	n.d.
LA 13379	1	Room 1	rectangular	1.6 x 1.4	3.2	0.4	basalt clasts and quartzite cobbles
LA 13380	1	Room 1	rectangular	2.8 x 1.7	4.5	0.9	basalt clasts and boulder
LA 13381	1	Room 1*	square	2.0 x 2.0	4.0		basalt and andesite clasts
		Room 2*	square	2.0 x 2.0	4.0	n.d.	basalt and andesite clasts
		* contiguous					
LA 13382	1	Room 1	rectangular	2.1 x 1.5	3.2	0.4	basalt clasts
LA 13383	3	Wall	linear	21.0	----	n.d.	basalt clasts
	4	Bin?	square	1.0 x 1.0	1.0	n.d.	basalt slabs
LA 13384	1	Check dam	linear	3.0 x 0.3	—	n.d.	basalt clasts
		Channel	linear	16.0 x 1.0	—	n.d.	basalt clasts
LA 13385	1	Rubble	n.d.	6.0 x 6.0?	n.d.	n.d.	basalt clasts
LA 13386	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	basalt and andesite clasts
LA 13387	1	Room?	rectangular	2.8 x 1.8	5.0	0.2	andesite clasts
LA 13388	1	Room 1	rectangular	1.9 x 1.5	2.9	n.d.	basalt clasts
		Depression 1	circular	3.0 diam.	7.1	n.d.	n.d.
LA 13389	1	Room 1	square	2.8 x 2.8	7.8	0.7	basalt clasts
		Room 2?	rectangular	1.0 x 0.6	0.6	n.d.	basalt clasts
LA 13390	1	Room 1	rectangular	3.2 x 2.0	6.4	0.5	elements and boulder
		Room 2	rectangular	2.2 x 0.6	1.3	0.5	elements and boulder
	2	Room 3†	rectangular	2.3 x 2.0	4.6	n.d.	basalt clast and boulder
		Room 4†	rectangular	1.5 x 1.4	2.1	n.d.	basalt clasts and boulder
		† contiguous					
LA 13391	1	Structures 1-7	square?	1.0 x 1.0	1.0	n.d.	basalt clasts
		Structure 8	rectangular	2.2 x 2.1	4.6	n.d.	basalt clasts
		Wall	linear	4.0	—	1.8	basalt clasts
LA 13392	1	Room 1	square	1.7 x 1.7	2.9	0.8	basalt clasts and boulders
	2	Room 2	U-shaped	2.0 x 1.8	3.6?	0.5	basalt clasts and boulders
		Room 3	circular	1.4 diam.	2.2	0.6	basalt clasts and boulders
	3	Room 4	oval	2.6 x 2.3	6.0	0.5	basalt clasts

TABLE III.4.6 (con't)

SITE NO./ PROV. NO.		FEATURE	SHAPE	INTERIOR DIMENSIONS	AREA	HEIGHT	CONSTRUCTION MATERIAL
LA 13398	1	Room 1††	ephemeral	2.0 x 2.0	4.0	n.d.	basalt clasts
		Room 2††	ephemeral	2.0 x 2.0	4.0	n.d.	basalt clasts
		†† contiguous					
LA 13399	1	Wall	semicircular	1.0 x 1.0	0.4	0.6	basalt clasts
LA 13340	1	Structure?	U-shaped	1.5 x 1.0	1.5	0.4	basalt clasts
LA 13402	1	Room?	square	4.0 x 4.0	16.0	0.3	basalt clasts
LA 13403	1	Room?	L-shaped	2.4 x 1.7	4.1	n.d.	basalt clasts
LA 13404	1	Room:	square	2.0 x 2.0	4.0	n.d.	masonry
		Check dams	n.d.	n.d.	n.d.	n.d.	n.d.
	2	Retaining wall?	linear	20.0 x 0.5	—	n.d.	basalt clasts
		Wall	linear	5.0 x 0.5	—	n.d.	basalt clasts
LA 13406	1	Pile of rocks	semicircular	1.0 diam.	0.4	n.d.	basalt clasts
		Pile of rocks	circular	1.0 diam.	0.8	n.d.	basalt clasts
LA 13408	1	Room 1	square	2.5 x 2.5	6.3	n.d.	basalt clasts and cobbles
		Room 2	square	3.0 x 3.0	9.0	n.d.	basalt clasts and cobbles
		Room 3	rectangular	4.0 x ?	n.d.	n.d.	basalt clasts
LA 13409	1	Room 1	rectangular	2.0 x 1.5	3.0	n.d.	basalt clasts
LA 13410	1	Room 1†	square	1.6 x 1.6	2.5	0.3	basalt clasts and boulder
		Room 2†	rectangular	2.5 x 2.2	5.5	0.3	basalt clasts and boulder
		† contiguous					
		Check dam	linear	7.0 x ?	—	n.d.	n.d.
LA 13466	1	Room 1	triangular	4.4 x 3.0	6.5	1.6	basalt clasts and boulders
LA 13347	1	Room 1	rectangular	1.3 x 1.2	1.7	0.8	basalt clasts
LA 13348	1	Room 1	rectangular	4.0 x 3.0	12.0	1.0	basalt and andesite clasts
LA 13349	1	Room 1	2.5 x 2.0		5.0	0.4	basalt clasts
LA 13450	1	Room 1	square	2.5 x 2.2	5.5	0.4	basalt and andesite clasts
LA 13451	1	A-frame	square	2.5 x 2.5	6.3	1.5	juniper posts
	2	Lean-to	n.d.	2.8 x 2.3	6.0	1.5	juniper, brush and dirt
	3	Corral	rectangular	13.0 x 7.0	91.0	n.d.	juniper poles and wire
LA 13452	1	Room 1	rectangular	3.0 x 2.5	6.3	0.4	tabular basalt clasts
LA 13453	1	Room 1†	square	3.0 x 3.0	9.0	0.8	fanglomerate
		Room 2†	rectangular	4.1 x 3.5	14.3	0.8	fanglomerate
		† contiguous					
	2	Room 3	rectangular	3.0 x 2.5	7.5	0.9	basalt, andesite boulders and clasts
LA 13454	1	Room 1††	square	1.5 x 1.5	2.3	0.4	basalt clasts
		Room 2††	square	1.5 x 1.5	2.3	0.4	basalt clasts
		†† contiguous					
LA 13455	1	Room 1	rectangular	2.5 x 2.0	5.0	n.d.	basalt clasts
	2	Rubble	ephemeral	2.0 x 0.5	n.d.	n.d.	basalt clasts
LA 13457	1	Room 1	rectangular	4.0 x 3.0	12.0	n.d.	basalt clasts
LA 13458	1	Corral	rectangular	10.0 x 7.0	70.0	1.5	juniper and barbed wire

TABLE III.4.7

CERAMIC FREQUENCIES—PERMANENT POOL SURVEY

SITE NO./PROV. NO.		SAMPLE SIZE†	DENSITY††	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 5011	1	408	.0122	Galisteo B/W	–	2	
				Unidentified G-P (Glaze A?)	–	1	
				Preglaze utility	–	2	5
LA 5012	1	504	.0139	Corrugated	–	3	
				Preglaze utility	–	4	7
LA 5013	1	49	.0204	Unidentified G-P	1	–	1
LA 5014	1	9	3.5560	Santa Fe B/W	10	–	
				Wiyo B/W	2	–	
				Kawahe'e B/W	1	–	
				Unidentified white	1	–	
				Corrugated	3	12	
				Corrugated diagonal	–	1	
				Plain rough	–	2	32
LA 5015	1	30	.0333	Santa Fe B/W	1	–	1
LA 9138	1, 2, 3	n.d.	n.d.	Ceramics present but not sampled	–	–	n.d.
	6	2200	.0001	Unidentified	n.d.	n.d.	2
LA 9139	1	n.d.	n.d.	Historic ceramics present but not sampled	n.d.	n.d.	n.d.
LA 10110	2	168	.0298	Santa Fe B/W	1	–	
				Unidentified white	1	2	
				Clapboard	–	1	5
LA 12160	1	20	.1000	Carbon polychrome	1	1	2
LA 12161	1	180	.1444	Santa Fe B/W	1	–	
				Abiquiu B/G	2	–	
				Kotyiti G-P	–	1	
				Salinas red	1	–	
				Unidentified G-P	–	2	
				Unidentified red	1	–	
				Posuge red	1	–	
				Carbon/red	1	1	
				Carbon polychrome	4	–	
				Plain smooth	–	8	
				Plain striated	–	1	
				Polished brown	–	1	
				Corrugated	–	1	26
LA 12438	1	2600	.0035	Abiquiu B/G	1	–	
				Largo G/Y	1	–	
				San Lazaro G-P	1	–	
				Unidentified G/Y	–	1	
				Unidentified G-P	–	1	
				Unidentified red	–	3	
				Brown utility	2	–	9
LA 12440	1	9	1.7778	Santa Fe B/W	5	2	
				Wiyo B/W	–	1(?)	
				Unidentified G/R	1	–	
				Clapboard	–	2	
				Corrugated diagonal	–	4	
				Gray utility	–	1	16
LA 12443	1	348	.0690	San Clemente G-P	5	–	
				Cieneguilla G/Y	2	1	
				Unidentified G-P	4	5	
				Unidentified red	–	3	
				Plain smooth	4	–	24

TABLE III.4.7 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 12446 1	144	.0278	Unidentified red	1	–	
			Plain smooth	1	1	
			Polished brown	–	1	4
LA 12447 1	25	.1200	Agua Fria G/R	1	–	
			Cieneguilla G-P	1	–	
			Black utility	–	1	3
LA 12448 1, 2, 3	1800	.0011	Agua Fria G/R	1	–	
			Unidentified G-P	1	–	2
LA 12452 1	8.3	.7229	Tewa polychrome	1	–	
			Unidentified redware	1	4	6
2	10.5	.4762	Unidentified G-P	4	–	
			Unidentified redware	–	1	5
LA 12454 1	100	.1500	Agua Fria G/R	1	–	
			Cieneguilla G/Y	5	–	
			Unidentified G-P	4	–	
			Unidentified redware (Glaze F?)	4	–	
			Posugue red	–	1	15
2	300	.0200	Unidentified G-P	1	–	
			Unidentified redware	4	–	
			Posugue red	–	1	6
LA 12461 1	78.5	.0255	Abiquiu B/G	n.d.	n.d.	
			San Clemente G-P	n.d.	n.d.	2
2	100	1.0000	Abiquiu B/G	1	–	
			Bandelier B/G	2	–	
			Agua Fria G/R	1	–	
			San Clemente G-P	1	–	
			Cieneguilla G-P	5	–	10
LA 12465 3	25	.0800	Unidentified utility	–	2	2
LA 12466 1	50	.0400	Tewa red(?)	n.d.	n.d.	
			Carbon/white	n.d.	n.d.	2
LA 12469 1	50	.0800	San Lazaro G-P	3	–	
			Plain smooth	–	1	4
LA 12470 1	25	.1200	Unidentified red	–	3	3
LA 12471 1	100	.0200	Unidentified	n.d.	n.d.	2
LA 12472 3	1625	.0056	Salinas red	1	–	
			Posugue red	–	1	
			Corrugated	–	2	
			Plain micaceous	–	1	
			Washboard micaceous	–	3	
			Unidentified utility	–	1	9
LA 12478 1	126	.0159	Santa Fe B/W	2	–	2
LA 12479 1	400	.0025	Unidentified utility	n.d.	n.d.	1
LA 12481 1	520	.1769	Unidentified G-P	1	–	
			Unidentified plain	1	–	2
LA 12482 1	1150	.0078	Agua Fria G/R	1	–	
			Cieneguilla G-P	1	–	
			Unidentified G/Y	–	4	
			Unidentified G-P	–	1	
			Unidentified utility	2	–	9
LA 12483 1	230	.0652	Agua Fria G/R	1	–	
			San Clemente G-P	1	–	
			Unidentified G/Y	2	1	
			Unidentified red	–	1	
			Unidentified white	1	–	

TABLE III.4.7 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 12483 1 (con't)			Plain smooth	–	1	
			Corrugated smudge	–	1	
			Washboard utility	–	4	
			Corrugated diagonal	–	1	
			Unidentified utility	–	1	15
LA 12486 1	130	.0308	Santa Fe B/W	1	–	
			Agua Fria G/R	1	–	
			Polished brown	2	–	4
LA 12489 1	60	.0333	Unidentified G-P	2	–	2
LA 12490 1	98	.0204	Unidentified utility	2*	–	2
LA 12491 2	36	.0278	Corrugated diagonal	1	–	1
LA 12496 1	1800	.0017	Santa Fe B/W	2	–	
			Unidentified G-P	1	–	3
LA 12503 1	200	.0050	Black utility	–	1	1
LA 12507 1	15	.0667	Salinas red	1	–	1
LA 12511 1	300	.0267	Santa Fe B/W	3	–	
			Wiyo B/W	1	–	
			San Clemente G-P	1	–	
			Corrugated	–	1	
			Ribbed	–	1	
			Plain brown	–	1	8
LA 12512 1	250	.0440	Agua Fria G/R	2	–	
			Cieneguilla G/Y	3	1	
			Unidentified G-P	–	1	
			Unidentified red	1	–	
			Unidentified white	3	–	11
LA 12513 1	20	.2000	Bandelier B/G	2	–	
			Unidentified G-P	2	–	4
LA 12514 1	36	.1667	Agua Fria G/R	1	–	
			San Clemente G-P	1	–	
			Cieneguilla G/Y	1	–	
			Unidentified G-P	1	–	
			Unidentified red	2	–	6
2	400	.0225	Wiyo B/W	5	–	
			Agua Fria G/R	1	–	
			Puaray G-P	2(?)	–	
			Unidentified red	1	–	9
LA 12517 1	4	.2500	Largo G-P	1*	–	1
2	12	.0833	Largo G-P	1*	–	1
				*same vessel		
LA 12519 1	64	.0313	Cieneguilla G/Y	1	–	
			Unidentifiedwhite	1	–	2
LA 12522 1	9	.5556	Wiyo B/W	2	–	
			Cieneguilla G/Y	1	–	
			Largo G-P	1	–	
			Clapboard	–	1	5
LA 12524 1	750	.0013	Unidentified G-P	1	–	1

KEY:

\+ sample size in sq. meters

++ density = ceramics per sq. meter

TABLE III.4.8

CERAMIC FREQUENCIES—FLOOD CONTROL POOL SURVEY

SITE NO./PROV. NO.	SAMPLE SIZE +	DENSITY++	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 5017 1	150	.0133	Kapo Black or blackened Red/Buff	2	–	2
LA 10114 1	9	.1111	Unidentified G-P	1	–	1
LA 12158 1	350[illegible]	.0001	Santa Fe B/W	2	–	
			Unidentified utility	–	3	5
LA 12162 1	1400	.0043	Unidentified G/R	2	–	
			Unidentified white	1	–	
			Carbon Polychrome	–	1	
			Plain Polished	1	–	5
LA 12163 3	6	.8334	Largo G/Y	4	–	
			Unidentified G/R	6	–	
			Unidentified G-P	7	–	17
LA 12172 1	36	.0556	Espinoso G-P	2	–	2
LA 12579 1a	10	4.2000	Santa Fe B/W	12	–	
			Abiquiu B/G	2	–	
			Agua Fria G/R	1	–	
			Unidentified G/R	7	2	
			Unidentified red polish	7	4	
			Unidentified G/Y	2	2	
			Smeared indented corrugated	–	1	
			Plain Utility	–	2	42
LA 12579 1b	10	5.5000	Galisteo B/W	–	1	
			Wivo(?) B/W	2	–	
			Abiquiu B/G	7	–	
			Agua Fria G/R	2	–	
			Unidentified G/R	4	4	
			Unidentified red	5	9	
			San Clemente G-P	2	–	
			Unidentified G-P	4	2	
			Unidentified red/yellow	1	–	
			Cieneguilla G/Y	1	–	
			Unidentified G/Y	3	5	
			Indented corrugated	–	1	
			Smeared indented corrugated	–	2	55
LA 12893 2	500	.0020	Espinoso G-P	–	1	1
LA 13012 1	1500	.0247	Abiquiu B/G	3	–	
			Agua Fria G/R	12	–	
			San Clemente G-P	5	–	
			Cieneguilla G/Y	2	–	
			Unidentified G/R (Agua Fria?)	1	–	
			Unidentified G/R	2	1	
			Unidentified G/Y	2	1	
			Unidentified G-P (San Clemente?)	1	–	
			Unidentified red	–	1	
			Unidentified glaze	–	1	
			Plain smooth	–	3	
			Corrugated	–	1	
			Blind indented	–	1	37
LA 13014 1	16	.3125	Abiquiu B/G	1	1	
			Agua Fria G/R	1	–	
			Largo G-P	1	1	
			Unidentified G/R	3	3	
			Unidentified G/Y	–	1	
			Unidentified glaze	2	3	
			Blind indented	–	1	
			Smeared corrugated	–	2	
			Neck bonded	–	1	21

TABLE III.4.8 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13014 2	200	.1900	Abiquiu B/G	1	–	
			Agua Fria G/R	3	–	
			Espinoso G-P	1	–	
			Unidentified G/R	10	11	
			Unidentified G/Y	6	–	
			Plain	–	1	
			Blind indented	1	5	38
LA 13015 1	195	.0718	Espinoso G-P	1	–	
			Unidentified G/Y or G-P	7	4	
			Unidentified utility	–	2	14
LA 13018 1	120	.0250	Unidentified G/R (Glaze A?)	1	–	
			Blind indented	–	2	3
LA 13019 1	200	.0100	Unidentified G/R	–	1	
			Unidentified G/Y	1	–	
			Plain	–	1	3
LA 13021 1	18	.8333	Bandelier B/G	2	–	
			Unidentified G/R	1	6	
			Unidentified G/Y	3	3	15
LA 13022 1	1125	1.0000	Largo G/Y	–	3*	
			Unidentified G/R	1	–	4
				*same vessel		
LA 13024 1	450	.0155	Agua Fria G/R	1	–	
			Unidentified G/Y	2	–	
			Unidentified G-P	3	–	
			Unidentified plain	–	1	7
LA 13027 1	9000	.0001	Bandelier B/G	n.d.	n.d.	1
LA 13028 1	7000	.0014	Largo G/Y	1	–	
LA 13030 1	100	.1000	Agua Fria G/R	3*	–	
			Espinoso G-P	4†	–	
			Unidentified G/R	–	2	
			Unidentified G-P	1	–	10
				*same vessel † same vessel		
LA 13031 1	4420	.0002	San Lazaro G-P	1	–	1
LA 13038 2	5700	.0005	Santa Fe B/W	–	1	
			Unidentified G/Y	–	2	3
LA 13039 1	450	.0889	San Clemente G-P	2*	–	
			Cieneguilla G/Y	1	–	
			Cneneguilla G-P	1	–	
			Largo G/Y	1	–	
			Unidentified G/R	–	5	
			Unidentified G/Y	8†	–	
			Unidentified G-P	2	–	
			Unidentified glaze	14	3	
			Blind indented	–	2	
			Unidentified utility	–	1	40
				*same vessel †6 vessels represented		
LA 13040 1	250	.0080	Agua Fria G/R	1	–	
			Unidentified glaze	–	1	2
LA 13047 1	375	.0027	San Clemente G-P	1	–	1

TABLE III.4.8 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13049 1	150	.0933	Santa Fe B/W	–	2	
			Abiquiu B/G	2*	–	
			Largo G/Y	1	–	
			Unidentified G/R	–	7†	
			Unidentified G/R (Glaze A?)	1	–	
			Unidentified G-P	1	–	14
				*same vessel †5 sherds from same vessel		
LA 13050 1	12	.0833	Agua Fria G/R	1	–	1
LA 13054 1	n.d.	n.d.	Unidentified G/R	–	1	1
LA 13055 1	2	1.0000	Unidentified G/R (Glaze A?)	–	1	
			Plain polished	1	–	2
5	108	.0185	Unidentified glaze (early-mid P-IV)	1	–	
			Unidentified glaze (historic?)	–	1	2
LA 13056 2	30	.1000	Unidentified G-P	–	1	
			Unidentified glaze	2*	–	3
				*same vessel		
LA 13057 1	9	.1111	Unidentified glaze	–	1	1
2	120	.0500	Unidentified G/R	2	2	
			Unidentified glaze	–	1	
			Plain micaceous	1	–	6
LA 13058 1	6	1.0000	Santa Fe B/W	2	–	
			Unidentified mineral (historic?)	–	1	
			Unidentified utility	–	3	6
2	400	.3000	Santa Fe B/W	2	–	
			Agua Fria G/R	1	2	
			Unidentified G/R	–	4	
			Unidentified G/Y	1	2	12
LA 13062 1	200	.0250	Agua Fria G/R	–	1(n.d.)	
			Cieneguilla G-P	–	1	
			Unidentified G/Y	–	3	5
LA 13064 1	45	.1333	Cieneguilla G-P	1	1	
			Unidentified G/R	–	2	
			Unidentified G/Y	–	1	
			Unidentified glaze	–	1	6
2	13	.3077	Unidentified G/R	1	–	
			Unidentified G-P	–	3	4
3	n.d.	n.d.	Ceramics present but not sampled	–	–	n.d.
4	n.d.	n.d.	Ceramics present but not sampled	–	–	n.d.
LA 13067 1	900	.0033	Unidentified G/R	–	2	
			Unidentified G-P	–	1	3
LA 13068 1	1500	.0033	Agua Fria G/R	1	–	
			Largo G/Y	1	–	
			Unidentified G/R	–	1	
			Unidentified G-P	–	2	5
LA 13070 1	300	.0333	Agua Fria G/R	1	–	
			Espinoso G-P	–	2	
			Unidentified G/R	–	1	
			Unidentified G/Y	–	1	
			Unidentified glaze	1	4	10

TABLE III.4.8 (con't)

SITE NO./PROV. NO.		SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13070	2	80	1.2500	Agua Fria	1	2	
				Cieneguilla G/Y	–	1	
				Unidentified G/R	–	2	
				Unidentified G-P	–	1	
				Unidentified glaze	–	3	10
LA 13072	1	25	.2000	Unidentified G/R	–	5	5
LA 13072	2	10	.5000	San Clemente G-P	2	–	
				Unidentified G/R	1	1	
				Unidentified G/Y	–	1	5
LA 13072	3	n.d.	n.d.	Agua Fria G/R	1	–	
				Largo G/Y	1	–	
				Unidentified G/R	–	3	
				Unidentified G/Y	–	2	7
LA 13074	1	420	.0143	Agua Fria G/R	3	–	
				Unidentified G/R (Glaze A?)	–	2	
				Unidentified glaze	–	1	6
LA 13076	1	8	1.5000	Bandelier B/G	3	–	
				San Clemente G-P	1	–	
				Espinoso G-P	3†	–	
				Unidentified G/R (Glaze A?)	2	1	
				Blind indented corrugated	1	1	12
					†2 sherds from same vessel		
	2	4	1.2500	Agua Fria G/R	1	–	
				Unidentified G/R	2	1	
				Glaze/white	–	1	5
	3	12	.4167	Agua Fria G/R	2	–	
				Unidentified G/R	1	–	
				Unidentified G/Y	–	2	5
LA 13077	1	3500	.0006	Unidentified G/Y	1	–	
				Unidentified G-P	–	1	2
LA 13078	1	400	.0175	Unidentified G/R	–	1	
				Unidentified G/Y	–	4	
				Blind corrugated	–	2	7
	2	6	2.5000	Bandelier B/G	5	–	
				Largo G/Y	1	–	
				Espinoso G-P	1	–	
				Unidentified G/Y	3	1	
				Unid. G-P	2	1(?)	
				Unidentified glaze	–	1	15
LA 13079	1	2250	.0004	Agua Fria G/R	1	–	1
LA 13080	1	3000	.0060	Bandelier B/G	2	–	
				Agua Fria G/R	4	1	
				Espinoso or San Lazaro G-P	1	–	
				Unidentified G/R	–	5	
				Unidentified G/Y	1	–	
				Unidentified G-P	2	–	
				Plain utility	–	2	18
LA 13082	1	16	.8125	Bandelier B/G	1	2	
				Unidentified G/R	–	5	
				Unidentified G/Y	1	3	
				Unidentified G-P	–	1	13
LA 13084	2	n.d.	n.d.	Agua Fria G/R	2	–	
				Unidentified G/R	5	1	8
LA 13086	2	24	.5000	Santa Fe B/W	2	–	
				Agua Fria G/R	–	1	
				Espinoso G-P	2	–	
				Unidentified G/Y	2	–	
				Unidentified G-P	1	1	
				Unidentified glaze	1	1	
				Corrugated (P-III)	–	1	12

TABLE III.4.8 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13086 3	912	.0011	Unidentified utility	–	1	1
LA 13290 1	n.d.	n.d.	Tewa red/buff	6*	–	6
				*all same vessel		
LA 13291 1	6	1.3333	Unidentified G-P	–	2	
			Puname polychrome	–	2	
			Carbon polychrome	2	2	8
4	4	1.2500	Puname Polychrome	–	5*	5
				*3 from same vessel		
5	575	n.d.	Unidentified G/R (Glaze A?) present but not sampled	n.d.	n.d.	n.d.
LA 13292 1	4500	.0022	Agua Fria G/R	–	1	
			Unidentified G/R	1	4	
			Unidentified G/Y	–	2	
			Unidentified G-P	–	1	
			Plain	n.d.	n.d.	10
LA 13293 1	160	.0813	Bandelier B/G	1	–	
			Agua Fria G/R	2	–	
			Unidentified G/R	1	5	
			Unidentified G-P	–	4	13
LA 13294 1	400	.0275	Bandelier B/G	3*	–	
			San Clemente G-P	1	–	
			Espinoso G-P	1	–	
			Unidentified G/R	1	–	
			Unidentified G/Y	2	2	
			Unidentified utility	–	1	11
				*same vessel		
LA 13296 1	875	.0046	Unidentified G/R	–	1	
			Unidentified G/Y	1		
			Unidentified glaze	1 (spout or bottleneck)		
LA 13300 1	25	.2000	Puaray G-P	5*	–	5
				*2 sherds from same vessel		
3	120	.0167	Bandelier B/G	2*	–	2
				*from same vessel		
LA 13307 1	240	.0042	Santa Fe B/W	1	–	1
LA 13308 1	90	.0111	Unidentified G/R	–	1	1
LA 13316 1	4	.5000	Blind indented corrugated	.	2	2
LA 13318 1	121	.0165	Agua Fria G/R	1	–	
			Unidentified plain utility	–	1	2
LA 13319 3	9	.1111	Unidentified glaze	–	1	1
LA 13323 1	9	.1111	Plain utility	–	1	1
LA 13324 1	60	.0333	Santa Fe B/W	–	1	
			Unidentified G/R	–	1	2
LA 13325 1	25	.2400	Unidentified G/R	–	1	
			Unidentified G/Y	2	–	
			Plain blind indented	–	3*	6
				*all same vessel		
LA 13328 1	25	.1200	Agua Fria G/R	1	–	
			Unidentified G/R	–	2	3

TABLE III.4.8 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13329 1	36	.0278	Glaze A(?) red	1	–	1
LA 13330 1	27	.0370	Unidentified G/Y	1	–	1
LA 13338 1	28	.3571	Santa Fe B/W	2	–	
			Unidentified G/R	–	2	
			Indented corrugated	–	6*	10
				*same vessel		
LA 13340 1	100	.0700	Santa Fe B/W	1	–	
			Unidentified G/Y	1	–	
			Unidentified G/R (Glaze A?)	2	1	
			Unidentified G/Y (Glaze A)	1	–	
			Unidentified G-P (Glaze C)	–	1	
			Ribbed	–	1	8
LA 13342 1	9	.3333	Agua Fria G/R	3	–	3
LA 13344 1	375	.0027	Unidentified	n.d.	n.d.	1
LA 13347 1	36	.1111	Agua Fria G/R	4	–	4
LA 13355 1	160	.0063	Santa Fe B/W	1	–	1
LA 13356 1	240	.0542	Santa Fe B/W	1	–	
			Agua Fria G/R	–	1	
			Indented corrugated	–	9	
			Blind indented corrugated	–	2	13
LA 13359 1	150	n.d.	Santa Fe B/W	n.d.	n.d.	n.d.
LA 13365 1	9	.4444	Unidentified carbon white	3	–	
			Plain utility	–	1	4
LA 13368 1	12	.3333	Bandelier B/G	3	–	
			Glaze red (A)	1	–	4
LA 13370 3	n.d.	n.d.	Unidentified buff	–	1	1
LA 13374 1	8	1.6250	Santa Fe B/W	7	1	
			Bandelier B/G	3	–	
			Blind indented corrugated	–	2	13
LA 13375 1	64	.0761	Santa Fe B/W	3	–	
			Corrugated	–	2	5
LA 13376 1	100	.0700	San Lazaro G-P	7*	–	7
				*6 sherds same vessel		
LA 13379 1	100	.0200	Unidentified G-P (Glaze C-E)	2	–	2
LA 13381 1	49	.0816	Carbon/white (Ogopoge Polychrome?)	4	–	4
LA 13382 1	25	.0400	Unidentified	n.d.	n.d.	1
LA 13390 1 and 2	2275	0022	Agua Fria G/R	2	–	
			Espinoso G-P	–	1	
			Unidentified glaze	1	1	5
LA 13391 1	4	2.0000	Historic plain, intersmoothed	–	8	8
LA 13392 1	n.d.	n.d.	Agua Fria G/R	1	–	
			Espinoso G-P	–	2	
			Unidentified G/Y	1	1	5
LA 13393 1	n.d.	n.d.	Unidentified G/Y	–	1	1
LA 13396 1	225	.1778	Unidentified G-P (Glaze C-E)	–	40	40

TABLE III.4.8 (con't)

SITE NO./PROV. NO.	SAMPLE SIZE	DENSITY	CERAMIC TYPE	BOWL	OLLA	TOTAL
LA 13398 1	100	.0200	Agua Fria G/R	2	–	2
LA 13400 1	25	.0800	Unid. white	1	–	
			Plain smooth	1	–	2
LA 13401 1	100	.2000	Unidentified G/R	5	–	
			Unidentified G-P	15	–	20
LA 13403 1	49	.1020	Abiquiu B/G	1	–	
			Agua Fria G/R	1	–	
			Unidentified G/R	2	–	4
LA 13404 1	100	.0200	Unidentified G/Y	2	–	2
LA 13406 1	300	1.0067	Espinoso G-P	1	–	
			Unidentified G-P	1	–	2
LA 13408 1	450	.0133	Agua Fria G/R	–	6*	6
				*all same vessel		
LA 13409 1	9	.8889	Santa Fe B/W	2	–	
			Unidentified white wares	3*	–	
			Carbon polychrome	–	3**	8
				*2 from the same vessel **3 sherds from the same pot		
LA 13410 1	250	.0280	Santa Fe B/W	3*	–	
			Abiquiu B/G	1	–	
			Unidentified white ware	–	1	
			Blind indented corrugated	–	2	7
				*same vessel		
LA 13454 1	100	.0200	Agua Fria G/R	1	1	2
LA 13455 2	6	2.0000	Unidentified G-P	3	–	3
LA 13457 1	39	n.d.	Ceramics present but not sampled	n.d.	n.d.	n.d.

TABLE III.4.9

LITHIC MATERIAL AND REDUCTION VARIABILITY PERMANENT POOL SURVEY

		MATERIAL VARIABILITY (All Artifacts)						REDUCTION VARIABILITY (Debitage, Cores and Hammerstones)															
								OBSIDIAN			BASALT			CHERT			CHALCED			OTHER			
SITE NO.	PROV. NO.	Obsidian	Basalt	Chert	Chalcedony	Other	Total	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	Hammerstones
LA 5011	1	5	2	–	8	–	15	3	1	–	1	1	–	–	–	–	2	3	3	–	–	–	–
LA 5012	1	8	1	–	9	1	19	2	5	1	1	–	–	–	–	–	3	5	1	–	1	–	–
LA 5014	2	1	10	5	–	–	16	1	–	–	7	3	–	3	2	–	–	–	–	–	–	–	–
LA 5015	1	3	1	1	–	–	5	–	3	–	–	–	1	–	–	1	–	–	–	–	–	–	–
LA 10110	1	–	–	–	1	–	1	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–
	4	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 10111	2	2	8	6	1	2	19	–	2	–	3	4	–	1	5	–	–	1	–	–	–	–	1
	4	–	1	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–
LA 12161	1	4	8	8	2	4	26	3	1	–	2	2	–	2	5	1	1	1	–	1	2	–	1
LA 12436	1	2	13	7	–	1	23	–	2	–	4	8	1	3	4	–	–	–	–	–	–	–	–
LA 12439	1	5	16	3	1	–	25	3	2	–	10	5	–	3	–	–	1	–	–	–	–	–	–
LA 12440	1	–	10	9	–	–	19	–	–	–	6	3	–	5	3	1	–	–	–	–	–	–	–
LA 12442	1	23	7	4	–	–	34	3	20	–	3	4	–	1	3	–	–	–	–	–	–	–	–
LA 12443	1	3	2	2	–	–	7	1	2	–	6	9	1	–	2	–	–	–	–	–	–	–	–
LA 12444	1	4	12	–	–	–	16	2	2	–	6	4	–	–	–	–	–	–	–	–	–	–	–
LA 12445	1	5	17	1	–	–	23	2	3	–	6	8	–	–	1	–	–	–	–	–	–	–	–
LA 12446	1	–	10	–	–	–	10	–	–	–	7	1	2	–	–	–	–	–	–	–	–	–	–
LA 12447	2	4	9	7	–	–	20	3	1	–	8	–	–	2	4	1	–	–	–	–	–	–	–
LA 12448	1	2	25	3	1	1	32	–	1	–	12	11	2	2	1	–	–	1	–	–	1	–	–
LA 12450	1	1	11	–	–	–	12	–	1	–	3	8	–	–	–	–	–	–	–	–	–	–	–
LA 12451	1	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12452	1	9	11	7	1	–	28	8	1	–	8	3	–	5	2	–	–	1	–	–	–	–	–
	2	3	20	8	–	–	31	2	1	–	7	13	–	4	3	1	–	–	–	–	–	–	–
LA 12454	1	–	12	–	1	1	14	–	–	–	6	5	1	–	–	–	–	1	–	–	–	–	–
	2	3	12	2	–	–	17	3	–	–	7	1	1	–	2	–	–	–	–	–	–	–	–
LA 12455	1	–	16	4	1	2	23	–	–	–	8	3	–	1	2	1	–	1	–	–	2	–	–
	2	1	4	–	–	2	7	–	–	–	1	–	2	–	–	–	–	–	–	–	–	–	–
LA 12456	1	–	10	–	1	1	12	–	–	–	6	4	–	–	–	–	–	1	–	–	1	–	–
	3	–	–	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	2	8	2	4	–	16	1	1	–	4	1	1	2	–	–	1	2	1	–	–	–	–

TABLE III.4.9 (con't)

SITE NO.	PROV. NO.	MATERIAL VARIABILITY (All Artifacts): Obsidian	Basalt	Chert	Chalcedony	Other	Total	REDUCTION VARIABILITY (Debitage, Cores and Hammerstones): OBSIDIAN No Cortex	Cortex	Cores	BASALT No Cortex	Cortex	Cores	CHERT No Cortex	Cortex	Cores	CHALCED No Cortex	Cortex	Cores	OTHER No Cortex	Cortex	Cores	Hammerstones
LA 12457	1	–	2	–	–	–	2	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–
LA 12459	1	–	15	–	1	–	16	–	–	–	4	7	–	–	–	–	1	–	–	–	–	–	–
LA 12460	1	6	3	–	–	–	9	5	1	–	1	1	1	–	–	–	–	–	–	–	–	–	–
	2	12	12	1	–	–	25	9	2	–	8	3	1	–	1	–	–	–	–	–	–	–	–
	*	–	4	–	–	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12461	2	4	9	5	–	–	18	3	–	–	6	3	–	2	3	–	–	–	–	–	–	–	–
LA 12462	1	1	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12463	1	8	8	3	–	1	20	8	–	–	2	3	1	3	–	–	–	–	–	–	–	–	1
LA 12465	4	1	6	2	–	–	9	1	–	–	5	1	–	–	2	–	–	–	–	–	–	–	–
LA 12466	1	1	13	1	1	–	16	1	–	–	10	3	–	–	1	–	1	–	–	–	–	–	–
LA 12468	1	3	11	4	–	1	19	1	1	–	6	2	–	1	3	–	–	–	–	–	1	–	–
	2	2	5	4	–	–	11	–	1	–	2	–	2	3	1	–	–	–	–	–	–	–	–
LA 12469	1	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12472	1	2	1	–	1	–	4	1	1	–	–	1	–	–	–	–	–	–	–	–	–	–	–
	3	12	6	–	2	–	20	6	5	–	2	3	–	–	–	–	1	1	–	–	–	–	–
LA 12474	1	–	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12478	1	4	6	–	1	2	13	2	1	1	1	4	–	–	–	–	1	–	–	1	–	1	–
LA 12479	1	4	4	5	5	–	18	2	2	–	3	1	–	3	2	–	3	1	–	–	–	–	–
LA 12480	1	–	–	–	1	1	2	–	–	–	–	–	–	–	–	–	–	1	–	–	1	–	–
LA 12481	1	11	13	1	10	2	37	6	3	–	7	4	1	1	–	–	3	6	–	–	1	1	–
	2	21	14	–	9	–	44	13	6	2	5	6	–	–	–	–	3	5	–	–	–	–	–
	3	32	7	1	7	–	67	28	24	–	4	–	2	1	–	–	3	3	–	–	–	–	–
LA 12482	1	9	17	1	9	2	38	2	6	–	5	7	1	1	–	–	1	6	–	–	–	–	1
LA 12483	1	3	6	7	–	1	17	1	1	1	2	3	–	5	2	–	–	–	–	–	1	–	–
LA 12485	1	2	5	–	8	–	15	1	1	–	1	2	2	–	–	–	2	5	1	–	–	–	–
LA 12486	1	4	18	12	2	1	37	4	–	–	6	9	1	4	8	–	–	1	–	–	–	–	–
LA 12489	1	4	2	4	–	1	11	3	1	–	2	–	–	1	3	–	–	–	–	–	1	–	–
LA 12490	1	–	10	4	–	3	17	–	–	–	4	5	–	–	4	–	–	–	–	–	–	1	1
LA 12491	2	5	1	2	4	–	12	3	1	–	–	1	–	1	1	–	1	3	–	–	–	–	–
LA 12494	1	5	15	9	8	1	38	2	1	–	6	6	–	2	7	–	2	6	–	–	1	–	1
LA 12495	1	2	13	8	1	1	25	1	1	–	3	5	2	2	3	1	–	1	–	–	–	–	3

TABLE III.4.9 (con't)

		MATERIAL VARIABILITY (All Artifacts)						REDUCTION VARIABILITY (Debitage, Cores and Hammerstones)															
								OBSIDIAN			BASALT			CHERT			CHALCED			OTHER			
SITE NO.	PROV. NO.	Obsidian	Basalt	Chert	Chalcedony	Other	Total	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	No Cortex	Cortex	Cores	Hammerstones
LA 12496	1	19	8	3	1	1	32	17	–	–	2	5	1	2	1	–	–	1	–	–	–	–	1
LA 12499	2	12	6	5	2	–	25	8	4	–	4	2	–	2	3	–	1	1	–	–	–	–	–
	*	2	1	–	1	–	4	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12502	1	3	5	1	2	–	11	2	1	–	3	2	–	–	1	–	–	2	–	–	–	–	–
LA 12503	1	10	5	5	–	1	21	5	5	–	2	3	–	1	3	–	–	–	–	–	–	–	–
LA 12508	1	4	18	4	–	–	26	1	3	–	8	8	2	2	2	–	–	–	–	–	–	–	–
LA 12509	2	–	75	–	–	–	75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12511	1	1	8	12	–	1	22	–	1	–	5	2	–	5	6	1	–	–	–	1	–	–	–
LA 12512	1	2	27	21	5	–	55	1	–	1	15	12	–	5	10	6	3	2	–	–	–	–	–
LA 12513	1	1	8	19	5	2	35	–	1	–	4	3	–	10	8	1	5	–	–	–	1	–	–
LA 12514	1	1	4	7	–	3	15	–	1	–	1	2	1	1	6	–	–	–	–	–	–	–	1
LA 12517	1	–	4	1	8	3	16	–	–	–	2	2	–	–	1	–	6	2	–	3	–	–	–
	2	–	2	–	3	–	5	–	–	–	–	1	1	–	–	–	–	3	–	–	–	–	–
LA 12518	1	4	4	5	–	–	13	1	3	–	3	1	–	2	3	–	–	–	–	–	–	–	–
LA 12519	1	1	3	4	1	–	9	–	1	–	2	1	–	1	3	–	–	1	–	–	–	–	–
LA 12520	1	1	6	7	2	–	16	–	1	–	2	4	–	–	5	2	–	2	–	–	–	–	–
LA 12521	1	4	–	2	3	2	11	2	2	–	–	–	–	1	1	–	2	1	–	–	1	–	–
LA 12522	1	2	18	7	5	–	32	1	1	–	13	4	1	4	3	–	1	3	1	–	–	–	–
LA 12524	1	–	2	–	–	1	3	–	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–
LA 12525	1	2	11	4	2	–	19	2	–	–	–	8	–	1	3	–	–	–	–	–	–	–	–

* sample from entire site

TABLE III.4.10

STONE TOOL USAGE: PERMANENT POOL SURVEY

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 5011	1	408.0	15	0.037	n.d.	10	n.d.	1	–	–	1	–	–	3	–	1	–	–	–	–
LA 5012	1	504.0	19	0.038	n.d.	12	n.d.	3	–	–	–	2	–	2	–	–	–	–	–	–
LA 5014	2	9.0	16	1.778	n.d.	13	n.d.	–	–	–	–	3	–	–	–	–	–	–	–	–
LA 5015	1	30.0	5	0.167	n.d.	2	n.d.	–	–	–	–	1	–	2	–	–	–	–	–	–
LA 10110	1	45.0	1	0.022	0%	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	4	3.2	1	0.313	100%	–	–	–	–	–	–	–	1	–	–	1	–	–	–	–
LA 10111	2	168.0	19	0.113	42%	13	5	–	–	–	–	3	2	–	1	8	–	–	–	–
	4	875.0	1	0.001	0%	–	–	–	–	–	–	–	–	1	–	–	–	–	–	–
LA 12161	1	180.0	26	0.144	n.d.	16	n.d.	3	–	–	–	1	1	1	1	2	–	1	1	1
LA 12436	1	4.0	23	5.750	39%	19	8	2	–	–	–	–	–	1	–	8	1	–	–	–
LA 12439	1	9.0	25	2.78	16%	20	3	1	–	1	–	3	–	–	–	4	–	–	–	–
LA 12440	1	9.0	19	2.111	58%	15	10	2	–	–	–	–	–	1	–	10	–	1	–	–
LA 12442	1	18.0	34	1.889	71%	24	24	10	–	–	–	–	–	–	–	24	–	–	–	–
LA 12443	1	18.0	21	1.167	10%	18	2	2	–	–	–	–	–	1	–	2	–	–	–	–
LA 12444	1	7.0	16	2.286	19%	10	1	2	–	–	–	2	2	–	–	3	–	–	–	–
LA 12445	1	731.0	23	0.031	52%	14	9	3	–	–	–	3	–	–	–	9	2	–	1	–
LA 12446	1	144.0	10	0.069	60%	8	6	–	–	–	–	–	–	2	–	6	–	–	–	–
LA 12447	2	5.0	20	4.000	25%	16	4	2	–	–	–	–	1	1	–	5	–	–	–	–
LA 12448	1	4.0	32	8.000	31%	28	9	1	–	1	–	–	–	2	–	10	–	–	–	–
LA 12450	1	25.0	12	0.480	33%	5	4	–	–	–	–	7	–	–	–	4	–	–	–	–
LA 12451	1	17.5	1	0.057	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
LA 12452	1	8.2	28	3.415	25%	23	7	2	–	–	–	3	–	–	–	7	–	–	–	–
	2	10.5	31	2.952	19%	28	6	1	–	–	–	1	–	1	–	6	–	–	–	–
LA 12454	1	100.0	14	0.140	21%	11	2	–	–	–	–	1	–	1	–	2	–	–	–	1
	2	300.0	17	0.057	39%	12	7	1	–	–	–	–	–	1	–	7	–	–	3	–
LA 12455	1	140.0	23	0.164	43%	16	5	1	–	–	–	–	5	1	–	10	–	–	–	–
	2	48.0	7	0.146	71%	–	1	–	–	1	–	1	1	2	–	3	–	–	–	2
LA 12456	1	11.0	12	1.091	67%	10	8	2	–	–	–	–	–	–	–	8	–	–	–	–
	3	36.0	1	0.028	100%	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–
	4	7.0	16	2.285	56%	9	7	2	–	–	–	1	2	2	–	9	–	–	–	–
LA 12457	1	16.0	2	0.125	100%	–	1	1	–	–	–	–	–	–	–	1	–	–	1	–
LA 12459	1	21.0	16	0.762	31%	12	1	–	–	–	–	–	2	–	–	3	–	–	2	–

TABLE III.4.10 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 12460	1	9.0	9	1.000	11%	5	1	1	–	–	–	2	–	1	–	1	–	–	–	–
	2	250.0	25	0.100	24%	8	5	4	–	–	1	11	–	1	–	6	–	–	–	–
LA 12460	*	–	4	–	100%	–	–	–	–	–	–	–	2	–	–	2	–	–	2	–
LA 12461	2	4.0	18	4.500	50%	12	8	4	–	–	1	1	–	–	–	9	–	–	–	–
LA 12462	1	400.0	1	0.003	100%	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–
LA 12463	1	12.0	20	1.667	20%	13	1	1	–	–	1	2	–	1	1	3	–	–	–	1
LA 12465	4	3.0	9	3.000	22%	9	2	–	–	–	–	–	–	–	–	2	–	–	–	–
LA 12466	1	8.0	16	2.000	13%	14	2	1	–	–	–	1	–	–	–	2	–	–	–	–
LA 12468	1	25.0	19	0.760	26%	12	1	1	–	–	2	2	–	–	–	3	–	–	1	1
	2	25.0	11	0.440	27%	6	1	–	–	–	2	1	–	2	–	3	–	–	–	–
LA 12469	1	50.0	1	0.020	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
LA 12472	1	25.0	4	0.160	n.d.	3	n.d.	–	1	–	–	–	–	–	–	1	–	–	–	–
	3	1625.0	20	0.012	n.d.	13	n.d.	3	–	–	1	2	–	–	–	1	–	–	1	–
LA 12474	1	375.0	1	0.003	100%	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
LA 12478	1	126.0	13	0.103	n.d.	5	n.d.	4	–	–	–	1	–	2	–	–	–	–	–	1
LA 12479	1	400.0	18	0.045	n.d.	13	n.d.	2	–	–	1	2	–	–	–	1	–	–	–	–
LA 12480	1	36.0	2	0.056	n.d.	2	n.d.	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12481	1	520.0	37	0.071	n.d.	24	n.d.	2	1	1	–	5	–	2	–	2	–	1	1	–
LA 12481	2	500.0	44	0.088	n.d.	29	n.d.	9	1	–	–	–	–	2	–	1	–	–	2	1
	3	250.0	67	0.268	n.d.	46	n.d.	4	–	–	1	13	–	2	–	1	–	–	1	–
LA 12482	1	1150.0	38	0.033	n.d.	22	n.d.	3	1	–	–	3	2	1	1	4	1	1	–	3
LA 12483	1	230.0	17	0.074	n.d.	14	n.d.	1	–	–	–	–	1	1	–	1	–	–	–	–
LA 12485	1	12.0	15	1.250	n.d.	8	n.d.	2	–	–	–	2	–	3	–	–	–	–	–	–
LA 12486	1	130.0	37	0.285	n.d.	26	n.d.	3	–	–	–	3	2	1	–	2	–	2	–	–
LA 12489	1	60.0	11	0.183	n.d.	8	n.d.	2	–	–	–	1	–	–	–	–	–	–	–	–
LA 12490	1	98.0	17	0.173	n.d.	12	n.d.	1	–	–	–	–	2	1	1	3	–	–	–	–
LA 12491	2	36.0	12	0.333	n.d.	10	n.d.	–	1	–	–	1	–	–	–	1	–	–	–	–
LA 12494	1	9.0	38	4.222	24%	28	4	1	–	–	2	4	2	–	1	9	–	–	–	–
LA 12495	1	9.0	25	2.778	40%	15	6	1	–	–	–	2	–	3	3	9	1	–	–	–
LA 12496	1	9.0	32	3.556	25%	14	5	7	1	–	1	7	–	1	1	8	–	–	–	–
LA 12499	2	8.0	25	3.125	32%	20	8	1	–	–	–	4	–	–	–	8	–	–	–	–
	*	–	4	–	100%	–	–	–	–	4	–	–	–	–	–	4	–	–	–	–
LA 12502	1	1750.0	11	0.006	n.d.	3	n.d.	3	–	–	–	3	–	–	–	–	–	–	–	–

TABLE III.4.10 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 12503	1	200.0	21	0.105	n.d.	10	n.d.	3	–	1	–	6	–	–	–	1	–	–	–	1
LA 12508	1	900.0	26	0.029	35%	19	9	1	–	–	–	4	–	2	–	9	–	–	–	–
LA 12509	2	25.0	75	3.000	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	75
LA 12511	1	28.0	22	0.786	32%	20	6	–	–	–	–	–	–	1	–	6	–	–	–	1
LA 12512	1	15.0	55	3.667	53%	42	29	5	–	–	–	1	–	7	–	29	–	–	–	–
LA 12513	1	20.0	35	1.750	26%	29	7	2	–	–	–	1	–	1	–	7	–	–	1	1
LA 12514	1	36.0	15	0.417	33%	11	2	–	–	–	–	–	1	1	1	4	–	–	–	1
LA 12517	1	4.0	16	4.000	n.d.	16	n.d.	–	–	–	–	–	–	–	–	–	–	–	–	–
	2	16.0	5	0.313	20%	3	1	1	–	–	–	–	–	1	–	1	–	–	–	–
LA 12518	1	49.0	13	0.265	n.d.	13	n.d.	–	–	–	–	–	–	–	–	–	–	–	–	–
LA 12519	1	64.0	9	0.141	33%	9	3	–	–	–	–	–	–	–	–	3	–	–	–	–
LA 12520	1	64.0	16	0.250	44%	12	7	2	·	–	–	–	–	2	–	7	–	–	–	–
LA 12521	1	450.0	11	0.024	36%	9	3	–	–	–	–	1	–	–	–	3	–	–	–	1
LA 12522	2	9.0	32	3.356	n.d.	26	n.d.	1	–	–	–	3	–	2	–	–	–	–	–	–
LA 12524	5	750.0	3	0.004	67%	–	–	1	–	–	–	–	1	–	–	1	–	–	1	–
LA 12525	4	875.0	19	0.022	47%	12	6	–	–	–	–	2	3	2	–	9	–	–	–	–

* sample from entire

TABLE III.4.11

FLOOD CONTROL POOL SURVEY
LITHIC MATERIAL VARIABILITY – ALL ARTIFACTS

SITE NO./PROV. NO.		OBSIDIAN			BASALT			CHERT			CHALCEDONY			OTHER			TOTAL ARTIFACTS
		Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	
LA 10114	1	5	1	–	2	–	–	–	–	–	2	2	–	–	–	–	12
LA 11591	1	–	–	–	55	–	–	–	–	–	–	–	–	–	–	–	55
	2	–	–	–	23	–	–	–	–	–	–	–	–	–	–	–	23
	3	–	–	–	33	–	–	–	–	–	–	–	–	–	–	–	33
LA 11592	2	–	–	–	61	–	–	12	–	–	8	–	–	–	–	1	82
LA 12158	1	–	2	–	24	–	–	4	–	2	7	2	–	1	–	–	42
LA 12162	1	7	–	–	1	–	–	1	–	3	–	2	–	2	–	1	17
LA 12163	1	12	–	–	.	–	–	–	–	–	1	–	–	–	–	–	13
	2	46	2	–	.	–	–	–	–	–	1	–	–	–	–	–	49
	3	6	1	–	12	–	–	–	–	–	3	1	–	–	–	–	23
	4	24	–	–	.	–	–	–	–	–	1	1	–	–	–	–	26
LA 12172	1	2	–	–	.	–	–	1	–	1	–	2	–	3	–	2	11
LA 12579	1	5	–	–	30	–	3	5	–	2	5	–	–	–	–	–	50
	2	17	–	–	95	–	6	10	–	–	12	–	–	1	–	–	141
LA 12893	1	–	–	–	21	–	1	1	–	–	4	2	–	–	–	–	29
	2	–	–	–	20	–	–	–	–	–	1	–	–	–	–	1	22
	3	–	–	–	13	–	–	–	–	–	11	–	–	–	–	–	24
LA 13010	1	–	–	–	124	–	–	–	–	–	2	–	–	–	–	–	126
LA 13012	1	6	–	–	29	–	–	14	–	–	10	8	–	6	–	–	73
LA 13014	1	3	–	–	5	–	–	5	–	2	2	–	–	1	–	1	19
	2	1	–	–	14	–	–	3	–	–	3	–	–	1	–	–	22
LA 13015	1	1	–	–	38	–	–	15	–	1	5	–	–	1	–	2	63
LA 13016	1	19	–	–	143	–	–	15	–	10	15	9	–	2	–	–	213
LA 13018	1	–	–	–	15	–	–	–	–	–	2	–	–	–	–	1	18
LA 13019	1a	18	–	–	30	–	–	5	–	–	8	–	–	–	–	–	61
	1b	33	5	–	7	–	–	–	–	–	2	1	–	–	–	1	49
LA 13020	1	1	–	–	19	–	–	–	–	–	3	–	–	1	–	–	24
LA 13021	1	–	–	–	8	–	–	–	–	–	2	–	–	–	–	–	10
LA 13022	1	46	9	3	50	–	1	1	–	10	21	–	–	3	–	2	146
LA 13023	1	1	–	–	6	–	–	2	–	–	–	1	–	–	–	–	10
	2	9	–	–	4	–	1	3	–	1	5	–	–	–	–	–	23
	*	2	2	–	1	–	–	1	–	–	–	–	–	–	–	–	6

TABLE III.4.11 (con't)

SITE NO./PROV. NO.		OBSIDIAN			BASALT			CHERT			CHALCEDONY			OTHER			TOTAL ARTIFACTS
		Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	
LA 13024	1	–	–	–	51	–	–	3	–	–	4	–	–				[illegible]
LA 13025	1	15	–	–	40	–	–	5	–	7	22	–	–	[illegible]	–	[illegible]	[illegible]
LA 13026	1	3	–	–	33	–	–	–	–	–	2	–	–	[illegible]	–	–	[illegible]
	2	–	–	–	20	–	–	1	–	2	1	–	–	–	–	–	[illegible]
LA 13027	1a	14	1	–	9	–	–	–	–	1	10	–	–	–	–	–	35
	1b	2	–	–	12	–	–	–	–	1	9	–	–	–	–	4	[illegible]
	*	–	–	–	–	–	–	–	–	–	–	–	–	[illegible]			
LA 13028	1	3	1	–	141	–	–	2	–	3	23	2	–	–	–		[illegible]
LA 13029	1	–	1	–	7	–	–	1	–	–	2	1	–	–			[illegible]
	2	–	–	–	21	–	–	1	–	–	–	–	–	–			[illegible]
	3	7	–	–	16	–	–	5	–	–	7	1	–	–	–		[illegible]
LA 13030	*	11	–	–	–	–	–	8	–	4	7	–	–	[illegible]	–	–	[illegible]
LA 13031	1a	23	–	–	–	–	–	–	–	1	3	1	–	[illegible]			[illegible]
	1b	20	–	–	2	–	–	2	–	–	2	–	–	–			[illegible]
	*	2	–	–	–	–	–	–	–	–	1	–	–				
LA 13033	1	[illegible]	–	–	1	–	–	–	–	1	2	–	–				[illegible]
LA 13034	1	1	–	–	–	–	–	–	–	–	3	1	–				[illegible]
	2	–	–	–	–	–	–	–	–	–	–	2	–	–			
LA 13035	1a	20	–	–	54	–	–	2	–	2	5	1	–				[illegible]
	1b	42	13	–	27	–	–	1	–	–	3	2	–			[illegible]	[illegible]
LA 13036	1	14	2	–	63	–	1	4	–	1	5						[illegible]
LA 13037	1	–	–	–	68	–	–	–	–	–	–	–	–				[illegible]
	2	–	–	–	38	–	–	–	–	–	1	–	–				[illegible]
LA 13038	1	1	–	–	37	–	–	1	–	1	10	–	–	[illegible]			
	2	7	–	–	49	–	–	–	–	–	11	–	–	[illegible]			[illegible]
LA 13039	1	8	1	–	76	–	–	1	–	6	14	–	–	[illegible]	–		
LA 13040	1	41	3	–	81	–	–	2	–	3	17	–	–				[illegible]
LA 13041	1	–	–	–	300	–	–	–	–	1	7	1	–				[illegible]
LA 13043	1a	–	–	–	109	–	–	–	–	–	2	–	–	–			
	1b	–	–	–	100	–	–	–	–	–	1	–	–				
LA 13044	1	–	–	–	28	–	–	–	–	–	3	–	–				
LA 13045	1	–	–	–	–	–	–	–	–	–	2	3	–				
LA 13046	1	1	–	–	1	–	–	2	–	–	6	–					
LA 13047	1	7	–	–	6	–	–	1	–	–	18	–	–				

TABLE III.4.11 (con't)

SITE NO./PROV. NO.		OBSIDIAN			BASALT			CHERT			CHALCEDONY			OTHER			TOTAL ARTIFACTS
		Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	
LA 13048	1	1	–	–	38	–	1	–	–	–	2	–	–	–	–	–	42
LA 13049	1	8	–	–	32	–	–	12	–	5	21	–	–	1	–	–	79
	2	–	–	–	–	–	–	1	–	–	1	–	–	–	–	–	2
LA 13050	•	8	–	–	2	–	–	4	–	–	2	–	–	–	–	–	16
LA 13052	3	–	–	–	61	–	–	–	–	–	1	–	–	–	–	–	62
LA 13053	1	2	–	–	55	–	–	–	–	–	4	–	–	–	–	–	61
	2	–	–	–	28	–	–	–	–	–	–	–	–	–	–	–	28
LA 13054	1	5	–	–	6	–	–	–	–	–	–	2	–	1	–	–	14
LA 13055	1	3	–	–	9	–	2	–	–	–	1	–	–	–	–	–	15
	2	1	–	–	10	–	–	–	–	–	–	–	–	–	–	–	11
	3	4	–	–	7	–	–	–	–	–	1	–	–	–	–	–	12
	4	–	–	–	13	–	–	–	–	–	–	–	–	–	–	–	13
	5	12	–	–	16	–	–	–	–	–	–	–	–	–	–	–	28
	6	1	–	–	13	–	–	–	–	–	–	–	–	–	–	–	14
LA 13056	1	1	–	–	59	–	–	6	–	5	6	5	–	1	–	1	84
	2	8	1	–	22	–	–	2	–	–	1	5	–	–	–	–	39
LA 13057	1	–	–	–	24	–	–	–	–	–	–	–	–	–	–	–	24
LA 13058	1	4	–	–	46	–	–	7	–	–	4	–	–	–	–	–	61
	2	–	–	–	57	–	–	2	–	–	7	–	–	1	–	1	68
LA 13060	1	–	–	–	85	–	–	–	–	–	6	–	–	–	–	–	91
LA 13061	1	–	–	–	9	–	–	–	–	–	–	–	–	–	–	–	9
LA 13062	1	2	–	–	19	–	–	–	–	–	–	–	–	–	–	3	24
LA 13063	1	–	–	–	5	–	–	1	–	1	–	–	–	–	–	–	7
LA 13064	1	–	–	–	19	–	–	–	–	–	2	–	–	–	–	–	21
	2	–	–	–	23	–	–	–	–	–	3	–	–	–	–	–	26
LA 13066	1	–	–	–	22	–	–	1	–	–	1	–	–	–	–	–	24
LA 13067	1	4	–	–	25	–	–	–	–	–	7	–	–	–	–	–	36
	•	1	–	–	–	–	–	–	–	–	–	–	–	–	–	2	3
LA 13068	1	–	–	–	23	–	–	–	–	–	3	–	–	–	–	–	26
LA 13070	1	–	–	–	24	–	–	–	–	–	–	–	–	–	–	–	24
LA 13072	1	–	–	–	26	–	–	–	–	–	1	–	–	–	–	–	27
	2	–	–	–	7	–	–	–	–	–	–	–	–	–	–	–	7
	3	–	–	–	11	–	–	–	–	1	–	–	–	–	–	–	12
LA 13073	1	–	–	–	–	–	–	–	–	–	2	–	–	–	–	–	2

TABLE III.4.11 (con't)

		OBSIDIAN			BASALT			CHERT			CHALCEDONY			OTHER			
SITE NO./PROV. NO.		Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	Local	Nonlocal	Unknown	TOTAL ARTIFACTS
LA 13074	1	–	–	–	35	–	–	–	–	–	–	–	–	1	–	1	37
LA 13076	1	2	–	–	31	–	–	–	–	–	1	–	–	–	–	–	34
	2	–	–	–	12	–	–	–	–	–	–	–	–	–	–	–	12
	3	–	–	–	19	–	–	–	–	–	–	–	–	–	–	–	19
LA 13077	1	16	4	–	22	–	–	1	–	–	6	4	–	–	–	1	54
LA 13078	1	–	–	–	52	–	–	–	–	–	1	–	–	–	–	–	53
	2	–	–	–	72	–	–	1	–	–	6	–	–	–	–	–	79
LA 13080	1	3	–	–	26	–	–	1	–	–	–	–	–	–	–	–	30
LA 13081	1	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1
LA 13082	1	1	–	–	47	–	–	–	–	–	2	–	–	–	–	–	50
LA 13083	1	2	–	–	–	–	–	–	–	1	–	–	–	–	–	–	3
LA 13084	2	–	–	–	18	–	–	–	–	–	–	–	–	–	–	–	18
LA 13085	1	5	–	–	9	–	–	3	–	1	–	4	–	–	–	–	22
LA 13086	1	–	–	–	28	–	–	–	–	–	–	–	–	–	–	–	28
	2	2	–	–	25	–	–	1	–	–	–	–	–	–	–	–	28
	3	–	–	–	26	–	–	1	–	–	1	–	–	–	–	–	28
LA 13291	*	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	1
LA 13292	1	3	–	–	39	–	–	–	–	–	1	–	–	–	–	–	43
LA 13293	1	–	–	–	12	–	–	1	–	–	–	1	–	–	–	–	14
LA 13294	1	–	–	–	27	–	–	4	–	–	–	–	–	–	–	–	31
LA 13295	1	1	–	–	8	–	–	–	–	–	–	–	–	–	–	–	9
LA 13296	1	–	–	–	12	–	–	–	–	1	–	–	–	–	–	–	13
LA 13297	1	–	–	–	1	–	–	–	–	–	–	–	–	–	–	–	1
LA 13298	1	9	–	–	2	–	–	2	–	–	–	–	–	–	–	1	14
LA 13300	1	3	2	–	9	–	–	–	–	–	–	–	–	–	–	–	14
	3	4	1	–	21	–	1	4	–	–	1	–	–	1	–	–	33
	4	–	–	–	–	–	1	–	–	–	–	–	–	1	–	1	3
LA 13302	1	–	–	–	57	–	–	–	–	–	–	–	–	–	–	–	57
LA 13307	1	16	4	–	5	–	–	–	–	–	–	–	–	–	–	–	25
LA 13308	1	7	–	–	89	–	1	9	–	2	2	–	–	–	–	–	110
LA 13311	1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
LA 13312	1	13	–	1	6	–	–	1	–	1	–	–	–	–	–	–	22
	3	–	–	–	–	–	1	–	–	–	–	–	–	–	–	–	1

TABLE III.4.11 (con't)

SITE NO./PROV. NO.		OBSIDIAN Local	OBSIDIAN Nonlocal	OBSIDIAN Unknown	BASALT Local	BASALT Nonlocal	BASALT Unknown	CHERT Local	CHERT Nonlocal	CHERT Unknown	CHALCEDONY Local	CHALCEDONY Nonlocal	CHALCEDONY Unknown	OTHER Local	OTHER Nonlocal	OTHER Unknown	TOTAL ARTIFACTS
LA 13313	1	–	–	–	17	–	–	–	–	–	–	–	–	–	–	–	17
LA 13316	1	–	–	–	1	–	–	–	–	–	1	–	–	–	–	–	2
LA 13318	1	1	–	–	19	–	1	1	–	–	–	–	–	–	–	–	22
LA 13321	1	24	–	–	12	–	1	5	–	2	–	–	–	–	–	–	44
LA 13323	*	1	–	–	2	–	–	1	–	–	–	–	–	–	–	–	4
LA 13324	1	1	–	–	4	–	–	2	–	1	2	–	–	1	–	–	11
LA 13325	1	–	–	–	1	–	–	–	–	–	2	–	–	–	–	–	3
LA 13330	1	2	–	–	12	–	–	–	–	–	1	–	–	–	–	–	15
LA 13338	1	3	–	–	5	–	–	2	–	2	4	–	–	–	–	1	17
LA 13340	1	3	–	–	14	–	1	5	–	–	2	–	–	1	–	2	28
LA 13342	1	1	–	–	15	–	–	36	–	4	25	–	–	2	–	1	84
LA 13343	1	–	–	–	15	–	–	–	–	–	–	–	–	–	–	1	16
LA 13344	1	–	–	–	4	–	–	4	–	7	4	–	–	6	–	1	26
LA 13345	1	1	–	–	1	–	–	–	–	1	4	–	–	2	–	–	9
LA 13347	1	1	–	–	6	–	–	1	–	–	4	–	–	1	–	–	13
LA 13348	1	4	–	–	78	–	–	6	–	–	18	–	–	–	–	5	111
LA 13349	1	3	–	–	11	–	–	–	–	–	3	–	–	–	–	–	17
LA 13350	1a	–	–	–	33	–	–	–	–	–	1	–	–	–	–	–	34
	1b	–	–	–	–	–	–	22	–	–	–	–	–	–	–	–	22
LA 13351	1	–	–	–	15	–	–	–	–	–	2	–	–	–	–	–	17
LA 13352	1	–	–	–	16	–	–	5	–	2	6	–	–	–	–	7	36
LA 13353	1	–	–	–	2	–	–	2	–	–	–	–	–	1	–	–	5
LA 13354	1	1	–	–	–	–	–	3	–	2	3	–	–	–	–	–	9
	*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1
LA 13356	1	1	–	–	2	–	–	7	–	1	7	–	–	–	–	1	19
LA 13358	1	8	–	–	1	–	–	6	–	–	3	1	–	–	–	–	19
LA 13359	1	–	–	–	–	–	–	2	–	–	16	1	–	–	–	1	20
	*	1	–	–	–	–	2	–	–	–	–	–	–	–	–	–	3
LA 13362	1	3	–	–	1	–	–	–	–	2	3	–	–	–	–	4	13
LA 13365	1	–	–	–	–	–	–	16	–	2	9	11	–	–	–	4	42
LA 13370	6	2	–	–	1	–	–	4	–	4	2	6	–	–	–	–	21
LA 13374	1	1	–	–	1	–	1	2	–	9	4	–	–	1	–	2	21
LA 13375	1	1	–	–	3	–	–	3	–	–	2	2	–	–	–	1	12
LA 13376	1	3	–	–	–	–	–	1	–	3	5	2	–	–	–	–	14

TABLE III.4.11 (con't)

SITE NO./PROV. NO.		OBSIDIAN Local	OBSIDIAN Nonlocal	OBSIDIAN Unknown	BASALT Local	BASALT Nonlocal	BASALT Unknown	CHERT Local	CHERT Nonlocal	CHERT Unknown	CHALCEDONY Local	CHALCEDONY Nonlocal	CHALCEDONY Unknown	OTHER Local	OTHER Nonlocal	OTHER Unknown	TOTAL ARTIFACTS
LA 13379	1	1	–	–	–	–	1	1	–	2	2	1	–	3	–	–	11
LA 13380	1	5	–	–	–	–	1	4	–	–	2	5	–	5	–	3	25
LA 13381	1	1	–	–	–	–	–	4	–	–	1	2	–	–	–	–	11
LA 13383	2	2	–	–	–	–	1	5	–	–	11	5	–	–	–	–	24
LA 13385	1	5	–	–	14	–	–	1	–	2	4	4	–	–	–	–	40
LA 13386	1	3	–	–	11	–	1	5	–	2	1	–	–	–	–	2	25
LA 13388	1	6	–	–	2	–	–	10	–	–	5	11	–	–	–	3	37
LA 13392	1	2	–	–	11	–	–	*	–	1	1	1	–	2	–	–	18
LA 13393	1	2	–	–	121	–	–	11	–	–	24	12	–	2	–	7	179
LA 13394	1	–	–	–	39	–	–	–	–	–	1	–	–	–	–	–	40
LA 13395	1	–	–	–	42	–	–	–	–	–	–	–	–	–	–	1	43
	2	–	–	–	29	–	–	–	–	–	–	–	–	–	–	–	29
LA 13396	1	1	–	–	14	–	–	1	–	–	4	4	–	2	–	–	26
LA 13398	1	–	–	–	3	–	–	–	–	–	–	–	–	–	–	–	3
LA 13400	2	1	–	–	8	–	–	–	–	–	6	–	–	–	–	–	15
LA 13401	1	–	–	–	15	–	–	–	–	–	2	–	–	–	–	–	17
LA 13402	1	–	–	–	19	–	–	–	–	1	–	–	–	–	–	–	20
LA 13403	1	–	–	–	17	–	–	–	–	–	–	–	–	–	–	–	17
LA 13404	1	–	–	–	13	–	–	–	–	–	–	–	–	–	–	–	13
LA 13405	1	–	–	–	13	–	–	–	–	–	–	–	–	–	–	–	13
LA 13408	2	–	–	–	20	–	–	–	–	–	–	–	–	–	–	3	23
LA 13409	1	–	–	–	–	–	–	2	–	–	–	2	–	–	–	–	4
LA 13410	1	2	2	–	1	–	–	2	–	–	1	5	–	1	–	–	14
LA 13449	1	–	–	–	1	–	–	2	–	1	3	–	–	–	–	–	7
LA 13450	1	–	–	–	1	–	–	25	–	–	13	–	–	1	–	5	45
LA 13452	1	3	–	–	15	–	1	8	–	–	6	–	–	1	–	–	34
LA 13453	2	3	–	–	2	–	–	–	–	5	14	6	–	3	–	–	33
LA 13454	1	1	–	–	21	–	–	2	–	–	–	–	–	–	–	–	24
LA 13455	1	–	–	–	16	–	–	–	–	–	–	–	–	–	–	–	16
LA 13455	2	1	–	–	5	–	–	1	–	–	–	–	–	–	–	–	7
LA 13457	1	2	–	–	13	–	–	–	–	–	–	–	–	–	–	–	15

* sample from entire site

TABLE III.4.12

FLOOD CONTROL POOL SURVEY REDUCTION VARIABILITY
(DEBITAGE, SMALL ANGULAR DEBRIS, CORES AND HAMMERSTONES)

		OBSIDIAN					BASALT					CHERT					CHALCEDONY					OTHER						
		Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.				
SITE NO.	PROV. NO.	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	HAMMERSTONES	TOTAL
LA 10114	1	1	2	—	—	—	2	—	—	—	—	—	—	—	—	—	1	2	—	—	1	—	—	—	—	—	—	9
LA 11591	1	—	—	—	—	—	29	17	7	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	55
	2	—	—	—	—	—	15	6	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24
	3	—	—	—	—	—	13	8	6	1	5	—	—	—	—	—	—	—	—		—	—	—	—	—	—	—	33
LA 11592	2	—	—	—	—	—	26	27	4	3	—	—	11	1	—	—	1	6	—	—	1	—	1	—	—	—	—	81
LA 12158	1	2	—	—	—	—	17	4	1	—	—	3	3	—	—	—	2	3	2	2	—	—	—	—	1	—	—	40
LA 12162	1	3	—	—	—	1	—	1	—	—	—	1	—	—	1	—	—	1	1	—	—	—	1	—	—	—	—	10
LA 12163	1	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	5
	2	18	9	1	3	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—		—		—	—	—	—	32
	3	5	2	—	—	—	1	7	1	—	—	—	—	—	—	—	2	1	—	—	1	—	—	—	—	—	—	20
	4	9	4	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—		—	—	—	—	—	—	—	—	15
LA 12172	1	—	2	—	—	—	—	—	—	—	—	1	1	—	—	—	—	1	—		1	1	3	1	—	—	—	11
LA 12579	1	2	2	—	—	—	28	4	—	—	—	5	2		—	—	3	1			—	—	—	—	—	—	—	48
	2	8	5	2	—	—	67	23	5	2	—	4	4	2	—	—	4	4	3		—	1	—	—	—	—	—	134
LA 12893	1	—	—	—	—	—	7	13	1*	—	—	1	—	—	—	—	4	1	1*		—			—	—	—	—	28
	2	—	—	—	—	—	4	13	1*		2		—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	22
	3	—	—	—	—	—	6	5	—	—	—	—	—	—	—	—	2	5	—	—	3	—			—	—	1	22
LA 13010	1	—	—	—	—	—	68	51	—	—	2	—	—	—	—	—	—	2	—	—	—	—		—	—	—	—	123
LA 13012	1	4	2	1*	—	—	16	9	1*	—	2	7	7	—	—	—	7	8	2*	—	1	—	3	—	—	1	—	71
LA 13014	1	1	2	—	—	—	2	3	—	—	—	4	3	—	—	—	1	1	—	—		—	2	—	—	—		19
	2	2		—	—		8	6	—	—	—	2	1	—	—	—	1	2	—		—	1			—	—		23

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13015	1	1	—	—	—	—	21	20	—	—	—	10	6	—	—	—	3	3	—	—	—	1	1	—	—	—	—	66
LA 13016	1	15	3	—	—	1	64	74	3*		5	10	12	1*	—	2	7	15	—	—	3	1	—	—	—	1	—	217
LA 13018	1	—	—	—	—	—	11	3	—	—	1	—	—	—	—	—	1	1	—	—	—	1	—	—	—	—	—	18
LA 13019	1a	12	5	—	—	—	17	9	1*	—	3	1	3	—	—	1	6	3	—	—	—	—	—	—	—	—	—	61
	1b	21	17	—	—	—	1	4	—	—	—	—	—	—	—	—	—	2	1*	—	—	1	—	—	—	—	—	47
LA 13020	1	—	1	—	—	—	10	8	—	—	—	—	—	—	—	—	1	1	—	—	1	—	1	—	—	—	—	23
LA 13021	1	—	—	—	—	—	3	—	1*	—	1	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	7
LA 13022	1	30	25	1*	—	—	43	4	3*	—	—	5	5	1*	—	1	16	5	—	—	—	3	2	—	—	—	—	144
LA 13023	1	—	1	—	—	—	—	3	1*	—	—	1	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	8
	2	6	3	—	—	—	2	1	—	—	1	1	3	—	—	—	4	—	—	—	—	—	—	—	—	—	—	21
	9†	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
LA 13024	1	—	—	—	—	—	29	18	3*	—	1	2	1	—	—	—	2	2	—	—	—	—	—	—	—	—	—	58
LA 13025	1	8	6	1*	—	—	16	19	3*	—	—	5	6	1*	—	—	16	3	1*	—	3	5	8	—	—	—	—	101
LA 13026	1	—	3	—	—	—	20	8	1*	—	1	—	—	—	—	—	—	2	—	—	—	1	—	—	—	—	—	37
	2	—	—	—	—	—	8	8	1*	—	—	—	3	—	—	—	—	1	—	—	—	—	—	—	—	—	—	21
LA 13027	1a	9	5	—	—	—	2	5	—	—	—	1	—	—	—	—	8	1	—	—	—	—	—	—	—	—	—	31
	1b	1	1	—	—	—	6	6	—	—	—	—	1	—	—	—	5	2	1*	—	1	—	3	1*	—	—	—	28
	9†	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
LA 13028	1	—	4	—	—	—	77	57	8*	—	4	2	7	1*	—	—	6	15	2*	—	2	—	—	—	—	—	—	185
LA 13029	1	—	1	—	—	—	4	2	1*	—	—	—	—	1*	—	—	2	—	1*	—	—	—	—	—	—	—	—	12
	2	—	—	—	—	—	5	11	2*	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21
	3	3	4	—	—	—	10	6	—	—	—	—	4	—	—	1	3	4	1*	—	—	—	—	—	—	—	—	46

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13030	1,2	3	8	—	—	—	—	—	—	—	—	8	4	—	—	—	2	5	—	—	—	2	—	—	—	—	—	32
LA 13031	1a	4	18	—	—	1	—	—	—	—	—	—	1	—	—	—	2	2	—	—	—	—	2	1*	—	—	—	31
	1b	6	11	2*	—	1	1	1	—	—	—	2	—	—	—	—	—	2	—	—	—	—	—	—	—	—	—	26
	1c	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1*	—	—	—	—	—	—	—	—	2
LA 13033	1	1	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
LA 13034	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2	1	—	—	1	—	—	—	—	—	—	5
	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1*	—	—	—	—	—	—	—	—	2
LA 13035	1a	9	9	1*	—	1	26	26	—	—	1	3	2	—	—	—	3	1	1*	—	—	—	1	—	—	—	—	84
	1b	32	18	1*	—	1	17	8	—	—	2	1	—	—	—	—	1	4	—	—	—	—	—	—	—	—	—	85
LA 13036	1	7	7	—	—	1	35	25	3*	—	—	2	2	1*	—	—	3	2	—	—	—	—	—	—	—	—	—	88
LA 13037	1	—	—	—	—	—	23	39	4*	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		66
	2	2	—	—	—	—	10	15	—	—	6	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	34
LA 13038	1	—	1	—	—	—	12	20	3*	—	—	1	1	—	—	—	3	5	2*	—	—	1		—	—	—	1	52
	2	2	3	1*	—	—	35	9	1	—	2	—	—	—	—	—	4	3	2*	—	2	1	—	—	—	—	—	65
LA 13039	1	7	2	—	—	—	41	28	8*	—	—	6	1	—	—	—	8	5	1*	—	—	1	—	—	—	—	—	108
LA 13040	1	33	10	—	—	—	45	22	8*	—	6	1	3	—	—	—	4	10	7*	—	—	—	—		—	—	—	149
LA 13041	1	—	—	—	—	—	226	49	4*	—	1	1	—	1*	—	—	2	5	—	—	—	—	—	—	—	—	—	289
LA 13043	1a	—	—	—	—	—	68	30	8*	—	2	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—		110
	1b	—	—	—	—	—	50	35	7*	—	2	—	—	—	—	—	—	—			1	—	—	—	—	—	—	95
LA 13044	1			—	—	—	16	10	2*	—	—	—	—	—	—	—	—	2		—	1	—	—			—	—	31
LA 13045	1	—		—	—	—	—	—	—	—	—	—	—	—	—	—	2	3			—	—	—	—	—	—	—	5
LA 13046	1		1	—	—	—	—	1	—	—	—	—	—	2	—	—	1	3	1*		1	—	—	—	—	—	1	11

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13047	1	5	1	—	—	1	4	—	2*	—	—	—	1	—	—	—	8	7	2*	—	1	—	2	—	—	—	—	34
LA 13048	1	—	1	—	—	—	26	5	5*	—	1	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	40
LA 13049	1	5	3	—	—	—	16	10	3	1	—	10	3	1	3	—	9	1	2	5	2	—	1	—	—	—	—	75
	2	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	2
LA 13050	1-4	2	4	—	—	—	—	2	—	—	—	2	1	1	—	—	1	1	—	—	—	—	—	—	—	—	—	14
LA 13052	3	—	—	—	—	—	23	28	4	3	3	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	62
LA 13053	1	—	2	1	—	—	43	6	4	—	—	—	—	—	—	—	2	1	1	—	—	—	—	—	—	—	—	60
	2	—	—	—	—	—	13	11	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26
LA 13054	1	3	—	—	—	—	1	4	—	1	—	—	—	—	—	—	—	1	1	—	—	—	1	—	—	—	—	12
LA 13055	1	2	1	—	—	—	7	2	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	14
	2	—	1	—	—	—	5	4	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
	3	2	2	—	—	—	3	—	2	—	2	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	12
	4	—	—	—	—	—	7	4	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	12
	5	8	2	—	—	—	12	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	26
	6	1	—	—	—	—	5	7	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	14
LA 13056	1	—	1	—	—	—	33	22	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	60
	2	6	2	—	—	—	11	7	2	1	1	1	1	—	—	—	5	1	—	—	—	—	—	—	—	—	—	38
LA 13057	1	—	—	—	—	—	10	11	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24
LA 13058	1	—	1	—	—	—	33	8	2	—	2	4	2	—	1	—	2	2	—	—	—	—	—	—	—	—	1	58
	2	—	—	—	—	—	30	19	4	2	1	1	1	—	—	—	1	5	1	—	—	—	1	—	—	—	—	66
LA 13060	1	—	—	—	—	—	59	16	3	5	3	—	—	—	—	—	1	3	—	2	—	—	—	—	—	—	—	92
LA 13061	1	—	—	—	—	—	3	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13062	1	1	—	—	—	—	15	2	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20
LA 13063	1	—	—	—	—	—	2	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4
LA 13064	1	—	—	—	—	—	13	5	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	21
	2	—	—	—	—	—	13	4	5	—	—	—	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	24
LA 13066	1	—	—	—	—	—	10	4	4	—	4	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	24
LA 13067	1	3	—	—	—	—	18	5	1	—	—	—	—	—	—	—	4	3	—	—	—	—	—	—	—	—	—	34
	9†	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0
LA 13068	1	—	—	—	—	—	15	5	—	1	1	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	25
LA 13070	1	—	—	—	—	—	14	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	24
LA 13072	1	—	—	—	—	—	23	2	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	27
	2	—	—	—	—	—	2	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7
	3	—	—	—	—	—	9	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
LA 13073	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	—	—	—	2
LA 13074	1	—	—	—	—	—	23	9	1	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	35
LA 13076	1	2	—	—	—	—	22	7	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	33
	2	—	—	—	—	—	9	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
	3	—	—	—	—	—	11	5	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	19
LA 13077	1	13	3	—	1	—	13	5	1	2	—	1	—	—	—	—	6	1	2	1	—	—	1	—	—	—	—	50
LA 13078	1	—	—	—	—	—	36	9	3	1	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	51
	2	—	—	—	—	—	55	12	2	2	—	1	—	—	—	—	2	4	—	—	—	—	—	—	—	—	—	78
LA 13080	1	—	—	—	—	—	9	12	2	3	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27
LA 13081	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1

TABLE III.4.12 (con't)

		OBSIDIAN					BASALT					CHERT					CHALCEDONY					OTHER						
		Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.				
SITE NO.	PROV. NO.	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	HAMMERSTONES	TOTAL
LA 13082	1	1	—	—	—	—	31	7	2	1	3		—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	47
LA 13083	1	1	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
LA 13084	2	—	—	—	—	—	13	2	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18
LA 13085	1	1	1	—	—	2	4	2	2	—	1	2	2	—	—	—	1	1	1	—	1	—	—	—	—	—	—	21
LA 13086	1	—	—	—	—	—	19	6	—	3	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	29
	2	—	1	—	—	1	19	3	2	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	27
	3	—	—	—	—	—	7	13	4	2	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	28
LA 13292	1	2	1	—	—	—	26	11	—	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	42
LA 13293	1	—	—	—	—	—	5	3	1	1	2	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	14
LA 13294	1	—	—	—	—	—	13	8	1	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	25
LA 13295	1	1	—	—	—	—	1	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9
LA 13296	1	—	—	—	—	—	9	3	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13
LA 13297	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
LA 13298	1	6	3	—	—	—	2	—	—	—	—	2	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	14
LA 13300	1	5	—	—	—	—	7	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11
	3	—	2	—	1	—	15	5	—	—	—	2	2	—	—	—	—	—	—	—	—	—	2	—	—	—	—	29
LA 13302	1	—	—	—	—	—	17	33	1	1	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	61
LA 13307	1	6	11	—	1	—	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	22
LA 13308	1	5	1	1	—	—	74	8	2	1	1	3	6	1	—	—	1	1	—	—	—	—	—	—	—	—	—	105
LA 13312	1	3	3		—	—	5	1	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	14
LA 13313	1	—		—	—	—	12	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15
LA 13316	1		—	—	—		1			—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	2

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13318	1	–	1	–	–	–	10	5	–	–	3	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		19
LA 13321	1	20	1	–	–	–	9	1	2	–	–	4	1	–	1	–	–			–	–	–	–	–	–	–		39
LA 13323	*	–	1	–	–	–		2	–	–	–	1	–	–	–	–	–				–	–	–	–	–	–	–	4
LA 13324	1	–	1	–	–	–	1	1	–	–	–	–	3	–	–	–	–	2	–	–	–	–	1	–	–	–	–	9
LA 13325	1	–	–	–	–	–	1		–	–	–	–	–	–	–	–	2	–			–	–	–	–	–	–	–	3
LA 13330	1	1	1	–	–	–	8	1	–	1	–	–	–	–	–	–	1	–		–	–	–	–	–	–	–	–	13
LA 13338	1	2	1	–	–	–	2	1	–	–	–	1	2	1	–	–	1	2	–	1	–	–	–	–	–	–		14
LA 13340	1	3	–	–	–	–	5	9	–		–	3	2	–	–	–	2		–		–	–	2		–	1	–	27
LA 13342	1	–	1	–	–	–	7	7	–	–	1	7	27	–	4	2	6	16		1	2	–	3	–		–		84
LA 13343	1	–	–	–	–	–	9	3	1	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–	–	–	14
LA 13344	1	–	–	–	–	–	4	–	–	–	–	8	2	1	–	–	3	1	–		–	4	2	1	–		–	26
LA 13345	1	1	–	–	–	–	–	1	–	–	–	1	–	–	–	–	2	–	–	–	–	–	–	–	–	1	–	6
LA 13347	1		–	–	–	–	3	3	–	–	–	1	–		–	2	1	–	–	1	–	–				–	–	11
LA 13348	1	2	2	–	–	–	44	28	1	3	1	2	3	1	–		6	11	1	–	–	1	4	–	–	–	–	110
LA 13349	1	3	–	–	–	–	9	1	–	–	–		–	–	–	–	3	–	–	–	–	–	–	–	–	–	–	16
LA 13350	1a	–	–	–	–	–	7	15	5	5	1	–	–			–		1	–	–	–	–				–		34
	1b	–	–	–	–	–	–	–	–	–	–	12	9	–	–	1	–	–	–	–	–			–				22
LA 13351	1	–	–	–	–	–	10	5	–	–	–	–	–	–	–		2	–	–	–	–	–	–	–	–	–	–	17
LA 13352	1		–	–	–	–	7	6	1	2	–	1	6	–	–	–	2	4	–	–	–	4	2	–		1	–	36
LA 13353	1	–	–	–	–	–	1	1	–	–	–	1	–	–	–	1	–				–	–	1	–	–	–		5
LA 13354	1	1	–	–	–	–	–	–	–	–	–	2	1	–	–	2	1	1			1	–	–	–	–	–	–	9
LA 13356	1			–	–	–	–	–	–	–	–	4	2	–		2	2	3	1		1	–	1	–			–	16

TABLE III.4.12 (con't)

SITE NO.	PROV. NO.	OBSIDIAN Debitage No cortex	OBSIDIAN Debitage Cortex	OBSIDIAN S.A.D. No cortex	OBSIDIAN S.A.D. Cortex	OBSIDIAN Cores	BASALT Debitage No cortex	BASALT Debitage Cortex	BASALT S.A.D. No cortex	BASALT S.A.D. Cortex	BASALT Cores	CHERT Debitage No cortex	CHERT Debitage Cortex	CHERT S.A.D. No cortex	CHERT S.A.D. Cortex	CHERT Cores	CHALCEDONY Debitage No cortex	CHALCEDONY Debitage Cortex	CHALCEDONY S.A.D. No cortex	CHALCEDONY S.A.D. Cortex	CHALCEDONY Cores	OTHER Debitage No cortex	OTHER Debitage Cortex	OTHER S.A.D. No cortex	OTHER S.A.D. Cortex	OTHER Cores	HAMMERSTONES	TOTAL
LA 13358	1	8					1					5	1				3	1										19
LA 13359	1											2					7	4	3	2	1				1			20
LA 13362	1	1	1					1				2					2		1			4						12
LA 13365	1											12	2		4		12	8				3	1					42
LA 13370	6	2							1			4	4				7		1				1					20
LA 13374	1							2				4	5	2			2	1			1	1	1					19
LA 13375	1	1					3					3					2	2				1						12
LA 13376	1	2										2	2				3				2							11
LA 13379	1	1										2	1				3					1	1			1		10
LA 13381	1	1										3			1		1	1			1					1		9
LA 13383	2	2										3	1		1		8	6	2*									23
LA 13385	1	5	8			2	10	3			1	1	1			1	3	5										38
LA 13386	1	1	2				5	6			1	2	3			2		1				1	1					25
LA 13388	1		6				2					4	4		1	1	6	9			1	1	2					37
LA 13392	1	1				1	7	3	1			1					1	1					1					17
LA 13393	1		2				67	36	10	5		4	6	1			16	14	1	3		4	5					174
LA 13394	1						14	17		6	1						1											39
LA 13395	1						20	16	3	2	1												1					43
	2						18	12																				30
LA 13396	1	1					6	6	2				1				2	6				1	1					26
LA 13398	1							3																				3
LA 13400	2		1				6	2									4	2										15

TABLE III.4.12 (con't)

		OBSIDIAN					BASALT					CHERT					CHALCEDONY					OTHER					HAMMERSTONES	TOTAL
		Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.			Debitage		S.A.D.				
		No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores	No cortex	Cortex	No cortex	Cortex	Cores		
LA 13401	1						10	5									2											17
LA 13402	1						12	7				1																20
LA 13403	1						6	10	1																			17
LA 13404	1						9	4																				13
LA 13405	1						5	7	1																			13
LA 13408	2						16	2	2																			20
LA 13409	1												1			1		1			1							4
LA 13410	1	4						1				1	1				4	1			1		1					14
LA 13449	1						1					3						2			1							7
LA 13450	1						1					10	7	7			4	8				1	3	2				43
LA 13452	1	1	1				10	5	1			3	4		1		3	3				1						33
LA 13453	2	1	2					2				3	1		1		11	4		4		1	1	1				32
LA 13454	1		1				17	2	1		1	2																24
LA 13455	1					1	11	5																				17
	2					1	2	2	1			1																7
LA 13457	1	1	1				10	3																				15

* cortex information was not recorded

† sample from entire site

TABLE III.4.13

STONE TOOL USAGE: FLOOD CONTROL POOL SURVEY

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	[illegible]	PROJECTILE PTS	[illegible]	RESHARPENING/ RETOUCH FLAKES	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LA 10114	1	9	12	1.33	33%	4	4	–	-	–	-				[illegible]		[illegible]				
LA 11591	1	13	55	4.23	24%	30	13	3	8	–	–	-		–			[illegible]				
	2	5	28	4.60	35%	12	8	–	2	–	–	–					[illegible]				
	3	4	33	8.25	15%	15	5	1	–	–	–	[illegible]					[illegible]				
LA 11592	2	1	82	82.00	21%	53	17	2	8		-						[illegible]				
LA 12158	1	30	42	1.40	10%	29	4	2	6	–	[illegible]		[illegible]				[illegible]				
LA 12162	1	30	17	0.57	18%	7	–	–	2	–	–	[illegible]	[illegible]		[illegible]						
LA 12163	1	0	13	n.d.	15%	5	2	3	–	–	–	–	[illegible]	[illegible]	[illegible]		[illegible]				
	2	115	49	0.43	18%	19	7	1	4	1	–	1	16	–		–	[illegible]				
	3	0	23	n.d.	35%	11	5	2	1	–	-	–	[illegible]	[illegible]	[illegible]		[illegible]				
	4	25	25	1.04	19%	10	4	1	–	-	-	1	10	-		-	[illegible]				
LA 12172	1	36	11	0.31	18%	7	2	–	2	–	–	–	[illegible]	–	[illegible]		2				
LA 12579	1	10	50	5.00	22%	36	11	–	–	–	–	[illegible]	[illegible]	–	[illegible]	[illegible]	11	[illegible]	[illegible]		
	2	10	141	14.10	23%	37	32	1	14	–	–	–	[illegible]	–	–	[illegible]	32	–			
LA 12893	1	32	29	0.91	38%	16	10	–	2	–	–	–	[illegible]	[illegible]	[illegible]	–	10		[illegible]		
	2	40	22	0.55	36%	10	8	1	1	–	-	-		[illegible]	2	–	8	[illegible]	–		
	3	105	24	0.23	33%	11	4	2	–	2	–	–	–	1	3	1	8	–	–	–	-
LA 13010	1	240	126	0.52	39%	66	47	9	–	–	–	–	–	2	2	–	[illegible]	–	–	–	–
LA 13012	1	1500	73	0.05	29%	44	18	–	4	–	–	2	–	1	4	–	21	–	–	–	–
LA 13014	1	16	19	1.19	32%	12	6	1	-	–	–	–	–	–	–	–	6	–	–	–	–
	2	40	22	0.55	59%	8	13	1	–	–	–	–	–	–	–	–	13	–	–	–	–
LA 13015	1	195	63	0.32	32%	43	19	–	–	1	–	–	–	–	–	–	20	–	–	–	–
LA 13016	1	300	213	0.27	31%	122	66	9	4	–	–	–	–	–	12	–	66	–	–	–	–
LA 13018	1	120	18	0.15	39%	10	7	–	–	–	–	–	–	–	1	–	[illegible]	–	–	–	–
LA 13019	1a	300	61	0.20	16%	43	10	1	1	–	–	–	1	–	5	–	10	–	–	–	–
	1b	300	49	0.16	33%	29	14	3	1	–	–	1	–	1	–	–	16	–	–	–	–
LA 13020	1	1000	24	0.02	42%	12	[illegible]	1	–	–	–	–	–	–	1	–	9	–	–	1	–
LA 13021	1	208	10	0.05	40%	4	1	1	–	–	–	–	–	3	1	–	4	–	–	-	-
LA 13022	1	250	146	0.58	28%	90	39	3	5	–	–	1	1	–	1	–	40	–	–	1	–
LA 13023	1	100	10	0.10	30%	4	1	1	1	–	–	–	–	2	1	–	3	–	–	–	–
	2	100	23	0.23	17%	16	3	1	–	–	–	–	1	–	1	–	3	–	–	1	-
	*	0	6	n.d.	100%	–	–	–	–	2	1	3	–	–	–	–	6	–	–	-	–

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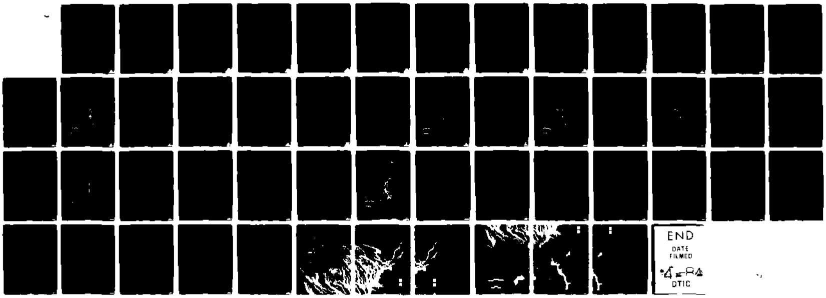
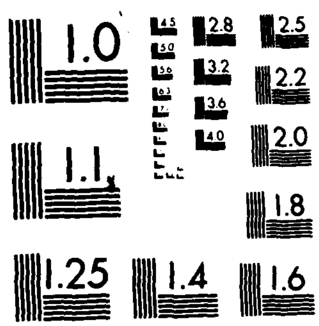




MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963 A

TABLE III.4.13 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING/ RETOUCH FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 13024	1	450	58	0.13	16%	43	9	2	3	–	–	–	–	–	1	–	9	–	–	–	–
LA 13025	1	350	104	0.30	40%	50	40	3	6	·	1	–	–	1	3	–	42	–	–	–	–
LA 13026	1	150	39	0.26	77%	6	27	2	1	3	–	–	–	–	–	–	30	–	–	–	–
	2	100	24	0.24	42%	11	8	1	1	1	–	–	–	1	1	–	10	–	–	–	–
LA 13027	1a	200	35	0.17	26%	21	9	2	–	–	–	–	3	–	–	–	9	–	–	–	–
	1b	200	28	0.14	43%	13	12	–	2	–	–	–	–	–	1	–	12	–	–	–	–
	*	0	1	n.d.	100%	–	–	–	–	–	–	–	–	–	–	–	–	1	–	–	–
LA 13028	1	700	180	0.26	31%	97	54	11	11	–	–	–	–	1	6	–	55	–	–	–	–
LA 13029	1	625	12	0.02	50%	3	6	–	3	–	–	–	–	–	–	–	6	–	–	–	–
	2	225	22	0.10	23%	12	5	1	2	–	–	–	–	–	2	–	5	–	–	–	–
	3	30	36	1.20	33%	21	12	1	1	–	–	–	–	–	1	–	12	–	–	–	–
LA 13030	*	250	33	0.13	52%	9	16	7	–	–	–	–	–	1	–	–	17	–	–	–	–
LA 13031	1a	104	31	0.30	55%	9	17	3	1	–	–	–	–	–	1	–	17	–	–	–	–
	1b	120	26	0.22	46%	5	12	6	2	–	–	–	–	–	1	–	12	–	–	–	–
	*	n.d.	3	n.d.	100%	–	–	–	–	–	3	–	–	–	–	–	3	–	–	–	–
LA 13033	1	700	6	0.01	17%	2	1	–	1	–	–	–	1	–	1	–	1	–	–	–	–
LA 13034	1	12	5	0.45	20%	3	1	–	–	–	–	–	–	–	1	–	1	–	–	–	–
	2	20	2	0.10	0%	1	–	–	1	–	–	–	–	–	–	–	0	–	–	–	–
LA 13035	1a	490		0.17	29%	53	25	2	2	–	–	–	1	–	2	–	25	–	–	–	–
	1b	6510	90	0.01	20%	66	16	2	1	–	2	–	–	–	4	–	18	–	–	–	–
LA 13036	1	150	90	0.60	42%	43	37	3	4	–	–	–	1	–	1	–	7	–	–	1	–
LA 13037	1	12	68	5.67	51%	29	35	–	4	–	–	–	–	–	–	–	35	–	–	–	–
	2	100	39	0.39	46%	14	14	1	–	–	–	–	–	4	6	–	18	–	–	–	–
LA 13038	1	300	52	0.17	50%	16	25	3	7	–	–	–	–	–	–	1	26	–	–	–	–
	2	300	68	0.23	29%	38	18	2	4	–	1	–	–	1	4	–	20	–	–	–	–
LA 13039	1	90	107	1.19	17%	80	18	–	9	–	–	–	–	–	–	–	18	–	–	–	–
LA 13040	1	250	151	0.60	27%	86	41	2	15	–	–	–	1	–	6	–	41	–	–	–	–
LA 13041	1	125	309	2.47	47%	139	145	3	5	–	–	1	15	–	1	–	146	–	–	–	–
LA 13043	1a	96	111	1.16	44%	52	48	–	8	–	–	–	–	1	2	–	49	–	–	–	–
	1b	100	101	1.01	43%	46	39	–	7	2	–	1	2	1	3	–	43	–	–	–	–
LA 13044	1	64	31	0.48	19%	22	6	–	2	–	–	–	–	–	1	–	6	–	–	–	–
LA 13045	1	6300	5	0.00	40%	3	2	–	–	–	–	–	–	–	–	–	2	–	–	–	–
LA 13046	1	250	11	0.04	27%	5	2	1	1	–	–	–	–	–	1	1	3	–	–	–	–

TABLE III.4.13 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING/ RETOUCH FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 13047	1	375	35	0.09	20%	22	6	–	4	–	1	–	–	–	2	–	7	–	–	–	–
LA 13048	1	8	42	5.25	7%	31	1	1	5	1	–	–	–	1	2	–	3	–	–	–	–
LA 13049	1	30	79	2.63	23%	40	17	1	15	–	–	–	3	1	2	–	18	–	–	–	–
	2	25	2	0.08	0%	1	–	–	1	–	–	–	–	–	–	–	0	–	–	–	–
LA 13050	*	150	16	0.11	25%	9	4	–	1	–	–	–	2	–	–	–	4	–	–	–	–
LA 13052	3	120	62	0.52	24%	32	15	5	7	–	–	–	–	–	3	–	15	–	–	–	–
LA 13053	1	25	61	2.44	26%	40	16	–	5	–	–	–	–	–	–	–	16	–	–	–	–
	2	4	28	7.00	21%	18	6	–	3	–	–	–	1	–	–	–	6	–	–	–	–
LA 13054	1	30	14	0.47	21%	7	3	–	2	–	–	–	2	–	–	–	3	–	–	–	–
LA 13055	1	25	15	0.60	27%	7	4	1	2	–	–	–	1	–	–	–	4	–	–	–	–
	2	80	11	0.14	55%	4	6	–	1	–	–	–	–	–	–	–	6	–	–	–	–
	3	0	12	n.d.	25%	4	3	1	2	–	–	–	–	–	2	–	3	–	–	–	–
	4	50	13	0.26	38%	6	5	–	1	–	–	–	1	–	–	–	5	–	–	–	–
	5	30	28	0.93	36%	15	10	–	–	–	–	–	2	–	1	–	10	–	–	–	–
	6	0	14	n.d.	64%	4	8	1	–	–	–	–	–	–	1	–	8	–	–	–	–
LA 13056	1	2	84	42.00	8%	70	6	1	3	–	–	–	–	–	3	1	7	–	–	–	–
	2	30	39	1.30	23%	26	8	–	3	–	1	–	–	–	1	–	9	–	–	–	–
LA 13057	1	0	24	n.d.	4%	20	1	–	2	–	–	–	–	–	1	–	1	–	–	–	–
LA 13058	1	20	61	3.05	21%	41	10	1	3	–	2	–	1	–	2	1	13	–	–	–	–
	2	50	68	1.36	13%	49	8	1	7	–	–	–	1	–	1	–	8	1	–	–	–
LA 13060	1	20	91	4.55	21%	59	19	–	10	–	–	–	–	–	3	–	19	–	–	–	–
LA 13061	1	12	9	0.75	44%	3	4	2	–	–	–	–	–	–	–	–	4	–	–	–	–
LA 13062	1	20	24	1.20	38%	12	6	–	2	–	–	–	1	–	–	–	6	–	–	3	–
LA 13063	1	300	7	0.02	37%	3	1	–	–	1	–	–	–	2	–	–	4	–	–	–	–
LA 13064	1	45	21	0.47	29%	11	5	2	1	–	–	–	–	–	1	1	6	–	–	–	–
	2	1	26	26.00	8%	16	2	2	5	–	–	–	1	–	–	–	2	–	–	–	–
LA 13066	1	6	24	4.00	8%	14	2	–	4	–	–	–	–	–	4	–	2	–	–	–	–
LA 13067	1	60	36	0.60	33%	20	12	1	1	–	–	–	2	–	–	–	12	–	–	–	–
	*	0	3	n.d.	100%	–	–	–	–	–	1	–	–	–	–	–	1	–	–	2	–
LA 13068	1	100	26	0.26	12%	21	3	–	1	–	–	–	–	–	1	–	3	–	–	–	–
LA 13070	1	5	24	4.80	17%	18	4	2	–	–	–	–	–	–	–	–	4	–	–	–	–
LA 13072	1	8	27	3.38	26%	18	7	1	1	–	–	–	–	–	–	–	7	–	–	–	–
	2	10	7	0.70	29%	5	2	–	–	–	–	–	–	–	–	–	2	–	–	–	–

TABLE III.4.13 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING/ RETOUCH FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	
LA 13072	3	16	12	0.75	17%	9	1	–	1	–	1	–	–	–	–	–	2	–	–	–	–
LA 13073	1	70	2	0.03	50%	–	1	–	1	–	–	–	–	–	–	–	1	–	–	–	–
LA 13074	1	20	37	1.85	11%	30	2	–	3	–	–	1	–	–	–	–	3	–	–	1	–
LA 13076	1	10	34	3.40	9%	30	3	–	1	–	–	–	–	–	–	–	3	–	–	–	–
	2	20	12	0.60	0%	11	–	–	1	–	–	–	–	–	–	–	0	–	–	–	–
	3	0	19	n.d.	37%	9	7	–	3	–	–	–	–	–	–	–	7	–	–	–	–
LA 13077	1	9	54	6.00	7%	36	4	3	7	–	–	–	4	–	–	–	4	–	–	–	–
LA 13078	1	6	53	8.83	11%	37	6	2	5	–	–	–	2	–	1	–	6	–	–	–	–
	2	5	79	15.80	18%	59	14	–	4	–	–	–	2	–	–	–	14	–	–	–	–
LA 13080	1	20	30	1.50	47%	11	11	–	5	–	3	–	–	–	–	–	14	–	–	–	–
LA 13081	1	90	1	0.01	100%	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–
LA 13082	1	16	50	3.13	20%	34	10	–	3	–	–	–	–	–	3	–	10	–	–	–	–
LA 13083	1	0	3	n.d.	33%	2	–	–	–	–	1	–	–	–	–	–	1	–	–	–	–
LA 13084	2	25	18	0.72	22%	11	4	–	2	–	–	–	–	–	1	–	4	–	–	–	–
LA 13085	1	40	22	0.55	18%	9	4	1	3	–	–	–	1	–	4	–	4	–	–	–	–
LA 13086	1	25	28	1.12	14%	20	4	1	–	–	–	–	2	–	1	–	4	–	–	–	–
	2	12	28	2.33	7%	23	2	–	2	–	–	–	–	–	1	–	2	–	–	–	–
	3	10	28	2.80	21%	16	6	–	6	–	–	–	–	–	–	–	6	–	–	–	–
LA 13291	*	0	1	n.d.	100%	–	–	–	–	–	–	1	–	–	–	–	1	–	–	–	–
LA 13292	1	45	43	0.96	33%	26	13	2	1	–	–	1	–	–	–	–	14	–	–	–	–
LA 13293	1	96	14	0.15	50%	2	7	1	2	–	–	–	–	–	2	–	7	–	–	–	–
LA 13294	1	100	31	0.31	36%	15	7	1	3	–	–	–	1	–	–	–	7	–	–	4	–
LA 13295	1	30	9	0.30	33%	6	3	–	–	–	–	–	–	–	–	–	3	–	–	–	–
LA 13296	1	875	13	0.01	23%	10	3	–	–	–	–	–	–	–	–	–	3	–	–	–	–
LA 13297	1	25	1	0.04	100%	–	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–
LA 13298	1	16	14	0.88	43%	7	6	1	–	–	–	–	–	–	–	–	6	–	–	–	–
LA 13300	1	25	14	0.56	21%	9	3	2	–	–	–	–	–	–	–	–	3	–	–	–	–
	3	80	33	0.41	54%	13	14	1	1	1	1	1	–	–	–	–	17	–	1	–	–
LA 13300	4	0	3	n.d.	100%	–	–	–	–	–	–	–	–	–	–	–	–	1	–	2	–
LA 13302	1	16	57	3.56	53%	18	29	3	2	1	–	–	1	–	3	–	30	–	–	–	–
LA 13307	1	24	25	1.04	32%	13	6	–	1	–	1	1	1	–	–	–	8	–	–	–	–
LA 13308	1	8	110	13.75	19%	75	21	3	5	–	–	–	5	–	1	–	21	–	–	–	–
LA 13311	1	0	1	n.d.	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–

TABLE III.4.13 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING/ RETOUCH FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 13374	1	2	21	10.50	14%	15	1	–	2	–	1	–	–	–	1	–	2	–	1	–	–
LA 13375	1	10	12	1.20	8%	10	1	1	–	–	–	–	–	–	–	–	1	–	–	–	–
LA 13376	1	12	14	1.17	21%	7	3	–	1	–	–	–	1	–	2	–	3	–	–	–	–
LA 13379	1	100	11	0.11	55%	4	5	–	–	–	–	–	–	–	1	–	5	–	–	1	–
LA 13380	1	100	25	0.25	12%	19	1	–	2	–	1	–	1	1	–	–	3	–	–	–	–
LA 13381	1	200	11	0.05	27%	5	1	–	1	–	–	–	–	2	2	–	3	–	–	–	–
LA 13383	2	700	24	0.03	21%	14	4	2	3	–	–	–	–	–	–	–	4	–	–	1	–
LA 13385	1	50	40	0.80	35%	18	14	4	–	–	–	–	–	–	4	–	14	–	–	–	–
LA 13386	1	150	25	0.17	12%	17	3	2	–	–	–	–	–	–	3	–	3	–	–	–	–
LA 13388	1	100	37	0.37	24%	24	9	1	1	–	–	–	–	–	2	–	9	–	–	–	–
LA 13392	1	2	18	9.00	39%	9	6	–	1	–	–	–	–	–	1	–	6	–	1	–	–
LA 13393	1	1	179	179.00	1%	156	2	1	20	–	–	–	–	–	–	–	2	–	–	–	–
LA 13394	1	25	40	1.60	5%	30	2	1	6	–	–	–	–	–	1	–	2	–	–	–	–
LA 13395	1	5	43	8.60	0%	37	–	–	5	–	–	–	–	–	1	–	0	–	–	–	–
	2	5	29	5.80	0%	29	–	–	–	–	–	–	–	–	–	–	0	–	–	–	–
LA 13396	1	8	26	3.25	0%	24	–	–	2	–	–	–	–	–	–	–	0	–	–	–	–
LA 13398	1	0	3	n.d.	33%	2	1	–	–	–	–	–	–	–	–	–	1	–	–	–	–
LA 13400	2	60	15	0.25	53%	7	8	–	–	–	–	–	–	–	–	–	8	–	–	–	–
LA 13401	1	10	17	1.70	35%	10	6	1	–	–	–	–	–	–	–	–	6	–	–	–	–
LA 13402	1	10	20	2.00	45%	11	9	–	–	–	–	–	–	–	–	–	9	–	–	–	–
LA 13403	1	5	17	3.40	29%	11	5	–	1	–	–	–	–	–	–	–	5	–	–	–	–
LA 13404	1	5	13	2.60	46%	7	6	–	–	–	–	–	–	–	–	–	6	–	–	–	–
LA 13405	1	5	13	2.60	62%	2	8	2	1	–	–	–	–	–	–	–	8	–	–	–	–
LA 13408	2	20	23	1.15	26%	15	6	–	2	–	–	–	–	–	–	–	6	–	–	–	–
LA 13409	1	9	4	0.44	25%	1	1	–	–	–	–	–	–	–	2	–	1	–	–	–	–
LA 13410	1	250	14	0.06	7%	10	1	2	–	–	–	–	–	–	1	–	1	–	–	–	–
LA 13449	1	5	7	1.40	14%	5	1	–	–	–	–	–	–	–	1	–	1	–	–	–	–
LA 13450	1	1	45	45.00	2%	34	–	1	9	–	–	1	–	–	–	–	1	–	–	–	–
LA 13452	1	2	34	17.00	44%	16	15	–	2	–	–	–	1	–	–	–	15	–	–	–	–
LA 13453	2	8	33	4.13	12%	21	4	–	8	–	–	–	–	–	–	–	4	–	–	–	–
LA 13454	1	16	24	1.50	13%	17	3	2	1	–	–	–	–	–	1	–	3	–	–	–	–
LA 13455	1	6	16	2.67	38%	8	6	2	–	–	–	–	–	–	–	–	6	–	–	–	–
	2	6		1.17	14%	4	1	–	1	–	–	–	–	–	1	–	1	–	–	–	–
LA 13457	1	39	15	0.38	20%	11	3	1	–	–	–	–	–	–	–	–	3	–	–	–	–

TABLE III.4.13 (con't)

SITE NO.	PROV. NO.	SAMPLE AREA SIZE	TOTAL ARTIFACTS	ARTIFACTS/ SQ. METER	PERCENT TOOLS	UNUTILIZED DEB.	UTILIZED DEB.	RETOUCHED DEB.	ANGULAR DEBRIS	UNIFACES	PROJECTILE PTS.	BIFACES	RESHARPENING/ RETOUCH FLAKES	CHOPPERS	CORES	HAMMERSTONES	TOTAL SILICIOUS TOOLS	1-HAND MANOS	2-HAND MANOS	METATES	OTHER GROUND STONE
LA 13312	1	16	22	1.38	23%	9	5	–	1	–	–	–	7	–	–	–	5	–	–	–	–
	3	0	1	n.d.	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
LA 13315	1	4	17	4.25	29%	7	5	4	–	–	–	–	1	–	–	–	5	–	–	–	–
LA 13316	1	20	2	0.10	0%	1	–	1	–	–	–	–	–	–	–	–	0	–	–	–	–
LA 13318	1	150	22	0.15	18%	14	2	1	–	–	–	–	–	2	3	–	4	–	–	–	–
LA 13321	1	36	44	1.22	25%	26	10	–	3	–	–	–	4	–	–	–	10	1	–	–	–
LA 13323	*	750	4	0.01	25%	2	1	1	–	–	–	–	–	–	–	–	1	–	–	–	–
LA 13324	1	250	11	0.04	27%	6	3	2	–	–	–	–	–	–	–	–	3	–	–	–	–
LA 13325	1	16	3	0.19	100%	–	3	–	–	–	–	–	–	–	–	–	3	–	–	–	–
LA 13330	1	80	15	0.19	60%	2	9	1	1	–	–	–	2	–	–	–	9	–	–	–	–
LA 13338	1	240	17	0.07	53%	5	7	–	2	–	–	–	1	–	–	–	7	–	–	2	–
LA 13340	1	100	28	0.28	29%	15	7	4	–	–	–	–	–	–	1	–	7	–	–	1	–
LA 13342	1	30	84	2.80	11%	65	9	–	5	–	–	–	–	–	5	–	9	–	–	–	–
LA 13343	1	32	16	0.50	25%	5	4	4	1	–	–	–	2	–	–	–	4	–	–	–	–
LA 13344	1	14	26	1.86	12%	21	3	–	2	–	–	–	–	–	–	–	3	–	–	–	–
LA 13345	1	20	9	0.45	11%	5	1	–	–	–	–	–	2	–	1	–	1	–	–	–	–
LA 13347	1	15	13	0.87	23%	9	3	–	–	–	–	–	–	–	1	–	3	–	–	–	–
LA 13348	1	3	111	37.00	8%	89	9	2	10	–	–	–	–	–	1	–	9	–	–	–	–
LA 13349	1	400	17	0.04	18%	13	3	–	–	–	–	–	1	–	–	–	3	–	–	–	–
LA 13350	1a	1	34	34.00	3%	22	1	–	10	–	–	–	–	–	1	–	1	–	–	–	–
	1b	1	22	22.00	9%	18	2	1	–	–	–	–	–	–	1	–	2	–	–	–	–
LA 13351	1	10	17	1.70	35%	7	6	4	–	–	–	–	–	–	–	–	6	–	–	–	–
LA 13352	1	8	36	4.50	19%	24	7	1	3	–	–	–	–	–	1	–	7	–	–	–	–
LA 13353	1	25	5	0.20	40%	2	1	1	–	–	–	–	–	–	1	–	2	–	–	–	–
LA 13354	1	0	9	n.d.	44%	2	4	–	–	–	–	–	–	–	3	–	4	–	–	–	–
	*	9	1	n.d.	100%	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	–
LA 13356	1	240	19	0.08	26%	8	3	1	1	–	–	–	1	–	3	–	3	–	2	–	–
LA 13358	1	80	19	0.24	32%	12	6	1	–	–	–	–	–	–	–	–	6	–	–	–	–
LA 13359	1	4	20	5.00	20%	9	4	–	6	–	–	–	–	–	1	–	4	–	–	–	–
	*	0	3	n.d.	100%	–	–	–	–	–	1	–	–	–	–	–	1	–	–	2	–
LA 13362	1	0	13	n.d.	15%	5	2	4	1	–	–	–	1	–	–	–	2	–	–	–	–
LA 13366	1	9	42	4.67	19%	29	8	–	5	–	–	–	–	–	–	–	8	–	–	–	–
LA 13370	6	320	21	0.07	33%	12	6	–	2	–	–	–	–	1	–	–	7	–	–	–	–

TABLE III.4.14

HISTORIC MATERIALS – PERMANENT POOL SURVEY

SITE NO./PROV.NO.	SAMPLE SIZE	ARTIFACT TYPE	FREQUENCY	DATE
LA 10110/Prov. 1	45	Food can, undiff.	1	post 1900
LA 10110/Prov. 4	4	Shotgun shell, plast. 20 gauge	4	post W.W. II
LA 10111/Prov. 1-6	3000	Food can, undiff.	1	post 1900
		Tobacco can, rect.	1	post 1907
		Vienna Sausage can, aluminum	1	post 1950
		Shotgun shell, plast. 20 gauge	6	post W.W. II
		Brass cartridge, Remington 223	3	post 1957
		Shotgun shell, paper 20 gauge	1	n.d.
LA 12434/Prov. 1	1	Large condensed milk	7	post 1900
		Food can, undiff.	6	post 1900
		Large condensed milk	2	1856-1900 (+–20)
		Syrup can, Log Cabin	2	1887-W.W. II
		Large condensed milk	8	post 1856
		Food can, undiff.	5	post 1856
		Small condensed milk	1	post 1856
		Rect. Bottle frag., aqua	1	1880-1920
		China Bowl frag.	1	post 1860
		Porcelain cup frag.	1	n.d.
		Round bottle frag., aqua	1	1880-1900
		Large condensed milk	11	post 1900
		Small condensed milk	2	post 1900
		Food can, undiff.	6	post 1900
		Steel beverage can	3	1953-1970
		Potted meat can	1	post 1900
		Vienna Sausage can, steel	1	1900-1970
		Aluminum foil	1	post W.W. II
		Small fruit can	-	post 1900
		5-gallon gas can	2	n.d.
		Juniper post with nails	9	n.d.
		Wooden box	1	n.d.
		Wooden chair	1	n.d.
LA 12435/Prov. 1	252	Steel beverage can	3	1953-1970
		Potted meat can	1	post 1900
		Vienna sausage can, steel	1	1900-1970
		Aluminum foil	1	post W.W. II
		Small fruit can	-	post 1900
LA 12437/Prov. 1	80	5-gallon gas can	2	n.d.
		Juniper post with nails	9	n.d.
		Wooden box	1	n.d.
		Wooden chair	1	n.d.
LA 12449/Prov. 1	800	Tobacco can, rect.	1	post 1907
		Large condensed milk	1	post 1900
		Lard can	1	post 1900
		Metal hinge	1	n.d.
		Sheep shears	1	n.d.
LA 12453/Prov. 1	96	Wire nail	n.d.	post 1880
		Steel pipe, 3 in. diam.	n.d.	n.d.
		Large bucket	1	n.d.
		Wire pot holder	1	n.d.
		Lumber, sawed	n.d.	n.d.

TABLE III.4.14 (con't)

SITE NO./PROV.NO.	SAMPLE SIZE	ARTIFACT TYPE	FREQUENCY	DATE
LA 12453/Prov. 1 (con't)		Corr. tin roofing	n.d.	n.d.
		Oil can	1	n.d.
		Int. Comb. engine, single cylinder	1	n.d.
		Large gear	1	n.d.
LA 12458/Prov. 1	1200	Steel pipe, 3 in. diam.	8	post 1880
LA 12462/Prov. 1	400	Coffee can	1	n.d.
LA 12472/Prov. 1	25	Food can, undiff.	3	post 1900
		Rect. "Spam"—type can	2	post 1920
		Sardine can	1	post 1900
		Screw top salad dressing jar	1	post 1930
		Crown cap bottle	1	post 1892
		Wire nail	3	post 1880
LA 12472/Prov. 3	1625	Food can, undiff.	3	post 1900
		Food can, undiff.	2	1856-1900 (+—20)
		Food can, undiff.	1	post 1894
		Tobacco can, rect.	1	post 1907
		Cigarette tin	1	1900-1950's
		Rect. bottle frag., purple	1	1880-1900
		Bottle frag., clear	1	post 1930
		Clear window glass	1	post 1915
		"D"—type battery post	1	post 1900
		paper match book	1	n.d.
		Metal button	1	post 1880
		22 cal. short, cartridge	1	n.d.
LA 12472/Prov. 4	1	aluminum sardine can	1	1953-1970
LA 12472/Prov. 1	375	Food can, undiff.	1	post 1900
		Can lid	1	post 1900
		Screw-top beer bottle	1	post 1930
		Lumber sawed	1	n.d.
		Rubber shoe heel	1	n.d.
		Triangular file	1	n.d.
		Barbed wire	1	post 1875
LA 12476/Prov. 1	30	Ovaltine can	2	post 1900
LA 12477/Prov. 1	9	Wire pot holder	1	n.d.
LA 12477/Prov. 2	9	Vienna sausage can, aluminum	4	post 1950
		Food can, undiff.	1	n.d.
		Wire nail	2	post 1880
		Wire staple	1	n.d.
LA 12484/Prov. 1	25	Lumber, sawed	1	n.d.
		Wire nail	2	post 1880
		Butane lighter, plastic case	1	post W.W. II
LA 12485/Prov. 1-2	300	Food can, undiff.	2	post 1900
		Canned-ham cans	1	post 1895
		44 cal. brass cartridges	2	post 1875
		Metal button	1	post 1870
		Spatula made from steel can	1	post 1880
LA 12488/Prov. 1	6	Tobacco can, rect.	1	post 1907
LA 12489/Prov. 1	60	Sardine can	1	post 1890
		Baline wire	1	n.d.
		Undiff. can fragments	5	n.d.

TABLE III.4.14 (con't)

SITE NO./PROV.NO.	SAMPLE SIZE	ARTIFACT TYPE	FREQUENCY	DATE
LA 12500/Prov. 1	600	Food can, undiff.	5	post 1900
		Baking powder can	1	post 1900
		Baking powder can	1	post 1925
		Syrup can	1	post 1900
		Lard can	1	post 1900
		Coffee can	1	1914-1927
		Tobacco can, rect.	2	post 1907
		Mustard jar, clear	1	post 1919
		Glass stopper, aqua	1	1880-1920
LA 12500/Prov. 2	60	Lard can	6	n.d.
		Food can, undiff.	2	n.d.
LA 12525/Prov. 1	375	Brass cartridge, Remington 223	1	post 1957

TABLE III.4.15

HISTORIC MATERIALS – FLOOD CONTROL POOL SURVEY

SITE NO./PROV.NO.	SAMPLE SIZE	ARTIFACT TYPE	FREQUENCY	DATE
LA 12158/Prov. 1	3500	Horseshoe	1	n.d.
LA 13011/Prov. 1	4000	Amber beer bottle	1	1905-1916
		Can, undiff.	3	post 1900
		potted meat can	1	post 1890
		Copenhagen snuff can	1	n.d.
		Hip tobacco tin	1	n.d.
		Wire nails	n.d.	post 1880
		Baling wire	n.d.	post 1870's
		Rubber heel	1	n.d.
		Large carrige bolt	1	n.d.
		6 inch stove pipe	1	n.d.
		Chamber pot	1	n.d.
		Wind alarm clock	1	n.d.
		Galvanized bucket	1	n.d.
		Horseshoe	1	n.d.
		Railroad spikes	n.d.	n.d.
LA 13046/Prov. 1	250	Barbed wire	1	n.d.
		Shotgun shell, paper 20 gage	1	n.d.
LA 13056/Prov. 1	150	Small leather shoe	n.d.	n.d.
		6mi polyethelene "trough?"	1	n.d.
LA 13070/Prov. 1	n.d.	tin can cup?	1	n.d.
LA 13304/Prov. 1	700	Vegetable can	2	n.d.
		Baline wire	n.d.	n.d.
		Copper wire	n.d.	n.d.
LA 13309/Prov. 1	1500	Porcelain cup frag.	3	pre 1917
		Amber glass bottle frag.	1	1905-1916
		? can	1	pre 1900
LA 13357/Prov. 1	n.d.	Lard Can	3	post 1907
		Ortega's Chilies can	1	n.d.
		Amber glass container	1	post 1873
LA 13366/Prov. 1	600	Hip tobacco tins	4	n.d.
		Food can, undiff.	30	n.d.
		Baking powder can	1	n.d.
		Steel sardine type cans	3	n.d.
LA 13366/Prov. 2	600	Condensed milk	3	n.d.
		Lard Cans	2	n.d.
		Food cans, undiff.	22	n.d.
LA 13367/Prov. 1	9	Amber glass bottle frag.	1	n.d.
		Lard can	1	n.d.
LA 13367/Prov. 2	6	Amber glass bottle frag.	4	n.d.
		Food cans, undiff.	2	n.d.
LA 13369/Prov. 1	25	Porcelain cup frag. (purple)	1	n.d.
		Lard can	1	n.d.
LA 13377/Prov. 1	2500	Amber glass bottle frag.	1	n.d.
		Bayer asprin bottle	1	n.d.
		Food can, undiff.	7	n.d.
		Tobacco can, rect.	1	n.d.
		Razor blade	1	n.d.

TABLE III.4.15 (con't)

SITE NO./PROV.NO.	SAMPLE SIZE	ARTIFACT TYPE	FREQUENCY	DATE
LA 13448/Prov. 1-3	2100	6 inch stove pipe	1	n.d.
		wire nails	n.d.	n.d.
LA 13451/Prov. 1	9	Lard can	1	n.d.
		Peters 38 cartridge	1	n.d.
		wire nails	n.d.	n.d.
		Commercial door hinges	n.d.	n.d.
		Karo syrup can lid	1	n.d.
LA 13458/Prov. 1	900	KC baking powder can	1	48 years old
		PA can	1	n.d.

TABLE III.4.16

ISOLATED OCCURRENCES IN COCHITI RESERVOIR

	SITUATION	VEGETATIVE STRUCTURE	TREES	BUSHES	GRASSES	CULTURAL PERIOD	DESCRIPTION	TYPE OF MATERIAL
1	Talus					Unknown	Petroglyph	
2	Base of talus	Dense Woodland	Juniper			Historic	Rock pile	Steel cable
3	Base of talus					Historic	Trap	Metal trap/baited
4						Unknown	Petroglyph	
5	Talus					Unknown	Cairn	
6	Bench	Barren/few trees	Juniper	Snakeweed	Grama	Unknown	Can dump	Tin cans
7	Sand dune	Barren/few trees	Juniper	Snakeweed	Dropseed	Unknown	Trap	Trap/bone baited
8	Bench					Unknown	Rock pile	
9	Alluvial flats	Open woodland	Juniper	Snakeweed		Unknown	Cairn	
10	Sand dune	Woodland Mosaic	Juniper			Historic	Isolated tin can	Tin can
11	Talus	Barren/few trees	Juniper	Pricklypear	Grasses	Historic	Isolated tin can	Tin can
12	Sand dune	Barren/few trees	Juniper	Cholla		Historic	Isolated bottle	Wine bottle
13	Sand dune	Barren/few trees	Juniper			Historic	Isolated tin can	Tin can
14	Talus		Juniper	Snakeweed	Dropseed	Historic	Trap	Metal trap/baited
15	Sand dune		Juniper	Rabbitbrush		Historic	Trap	Trap/bone baited
16						Unknown	Trap	
17	Base of talus		Juniper		Grama	Anasazi(?)	Sherd scatter	Sherds & ground stone
18	Sand dune		Juniper	Snakeweed	Dropseed	Unknown	Firecracked rocks	
19	Base of talus		Juniper	Snakeweed		Historic	Firecracked rocks	Bottle glass
20	Sand dune		Juniper			[illegible]	Isolated tin can	Tin cans
21	Sand dune					Historic	Isolated bottle	Bottle glass
22	Sand dune					Lithic Unknown	Lithics	Lithics
23			Juniper			Unknown	Trap	Metal trap/baited

TABLE III.4.16 (con't)

	SITUATION	VEGETATIVE STRUCTURE	TREES	BUSHES	GRASSES	CULTURAL PERIOD	DESCRIPTION	TYPE OF MATERIAL
24						Historic	Isolated bottle	Wine bottle
25	Sand dune		Juniper	Rabbitbrush		Unknown	Cairn	
26	Talus		Juniper	Snakeweed		*Unknown*	*Lithics*	Chert nodule
27		Barren/few trees				Historic	Isolated tin can	Tin can
28	Beach	Sand				Historic	Hearth	
29	Alluvial flats	Barren/few trees				Historic	Hearth	
30	Beach	Sand				*Historic*	*Hearth*	
31	Sand dune	Sand				Historic	Hearth	
32						*Historic*	Hearth	
33	Beach					Historic	Hearth	
34	Bench					*Historic*	*Hearth*	
35	Beach					Modern	Hearth	
36	Bench	Savanna		Snakeweed	Grama	Modern	Hearth	
37	Canyon bottom					Unknown	Petroglyph	
38	Cliff face					*Unknown*	*Petroglyph*	
39	Gravel ridge	Open woodland	Juniper	Snakeweed		Unknown	Cairn	
40	Basalt talus	Woodland Mosaic	Juniper	Snakeweed	Grama	Unknown	Cairn	
41	Arroyo	Savanna	Elm	Snakeweed	Rice	Modern	Can dump	Cans
42	Arroyo		Juniper	Apache Plume		Anasazi(?)	Petroglyph	
43	Gravel ridge	Woodland	Juniper	Rabbitbrush Snakeweed		Unknown	Cairn	
44	Alluvial terrace		Juniper	Pricklypear Yucca bacata		Anasazi(?)	Petroglyph	
45	Arroyo	Grassland		Yucca	Dropseed Rice	Historic	Can dump,	Tin cans, glass
46	Alluvial terrace	Woodland Mosaic	Juniper	Horseweed		Anasazi	Projectile point	Petrified wood

III.5
Significance of Cultural Resources in Cochiti Reservoir

JAN V. BIELLA and RICHARD C. CHAPMAN

INTRODUCTION

In compliance with the intent of Section 106 of the National Historic Preservation Act of 1966, Section 102 2(c) of the National Environmental Policy Act of 1969, Section 2(b) of Executive Order 11593, and the Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties (36 C. F. R. Part 800), this chapter will provide an assessment of significance of cultural resources directly impacted by the permanent and flood control pools of Cochiti Reservoir.

No archeological site or population of sites is inherently significant. Sites can only be assigned significance when assessed against a specific referent or set of referents. While a certain population of sites has the potential to yield information pertinent to a specific research problem, and hence exhibit scientific significance, a different population of sites might exhibit a greater recreational or educational potential and be more significant in social terms. Thus the potential significance of cultural resources is dependent upon several criteria of evaluation. Scientific, historic, monetary and social standards have been suggested as relevant criteria in this regard (Scovill, Gordon and Anderson 1973).

This chapter will focus upon defining several different realms of scientific and historic significance. At present the professional archeological community recognizes no absolute procedure for scaling scientific or historic significance, beyond a growing consensus that cultural resources may only acquire significance with respect to specific research problems. Since archeological research is a dynamic scientific process, definition of specific archeological research problems which may be employed to assess significance is largely contingent upon the cumulative knowledge derived through previous research. For this reason, no particular set of research problems can be universally employed to assign significance.

The following assessment of cultural resources in Cochiti Reservoir will be based upon evaluating the potential these resources have for providing information concerning the research problems addressed in Section I.

FORAGING SYSTEMS OF ADAPTATION

Archeological models generally employed for description or analysis of foraging systems of adaptation are almost universally based upon ethnographic observations of extant, band-organized human populations whose subsistence, in an energetic sense, is derived predominantly through *procurement* of nondomesticated floral and/or faunal resource species. The fact that such resources have been demonstrated to comprise an aspect of subsistence for cultural adaptive systems whose energetic base is predominantly derived through *production* of domesticated resources is commonly recognized.

In the absence of well defined absolute or relative dating techniques, it is extremely difficult to assign such remains to the operation of predominantly foraging or predominantly nonforaging adaptive systems. For this reason, the significance of nonstructural open site locations will be assessed according to problem realms appropriate for both Archaic and Anasazi Periods of settlement within the study area.

Archaic Foraging Behavior

The Archaic Period within the Middle Rio Grande region can be postulated to date between ca. 4800 B.C. and A. D. 400 (Irwin-Williams 1973). Models for Archaic systems of adaptation, as defined through previous archeological research in the American Southwest, have suggested several expectations concerning the structure and organization of subsistence related activities undertaken by Archaic populations. These include subsistence based upon procurement of a wide variety of nondomesticated floral and faunal food resources, low human population density within given regions, small local group size, and a high degree of seasonal mobility by human groups throughout effective regions.

Activity-specific components of such adaptive systems have been postulated to involve a limited inventory of technological items for procurement, processing and/or consumption of food resources. Logistical strategies articulating those activities have been suggested to involve seasonal mobility of personnel to different locations where food resources are available, with the result of minimizing energy investment into construction of facilities for habitation, food resource, storage or transportation.

Specific research oriented toward description or explanatory treatment of Archaic Period site locations within the study area has been limited to survey data reported by Flynn and Judge (1973) and Snow (1970, 1973a). Only one of these site locations has been intensively analyzed (Snow 1973c). Because of this, the scope and general explanatory goals of research problems outlined below have been restricted to those which will result in establishing warranted descriptive statements concerning Archaic foraging behavior as manifest within the project boundaries.

1. Dating

An initial problem which must necessarily be approached concerning Archaic adaptation within the study area is that of developing means to assign site locations to one or more temporal phases within that period. Although Irwin-Williams (1973) has proposed five phases spanning a temporal frame of some 6000 years for Archaic behavior within the Rio Puerco Valley to the west of the study area, no such sequence has been rigorously defined for the Middle Rio Grande region

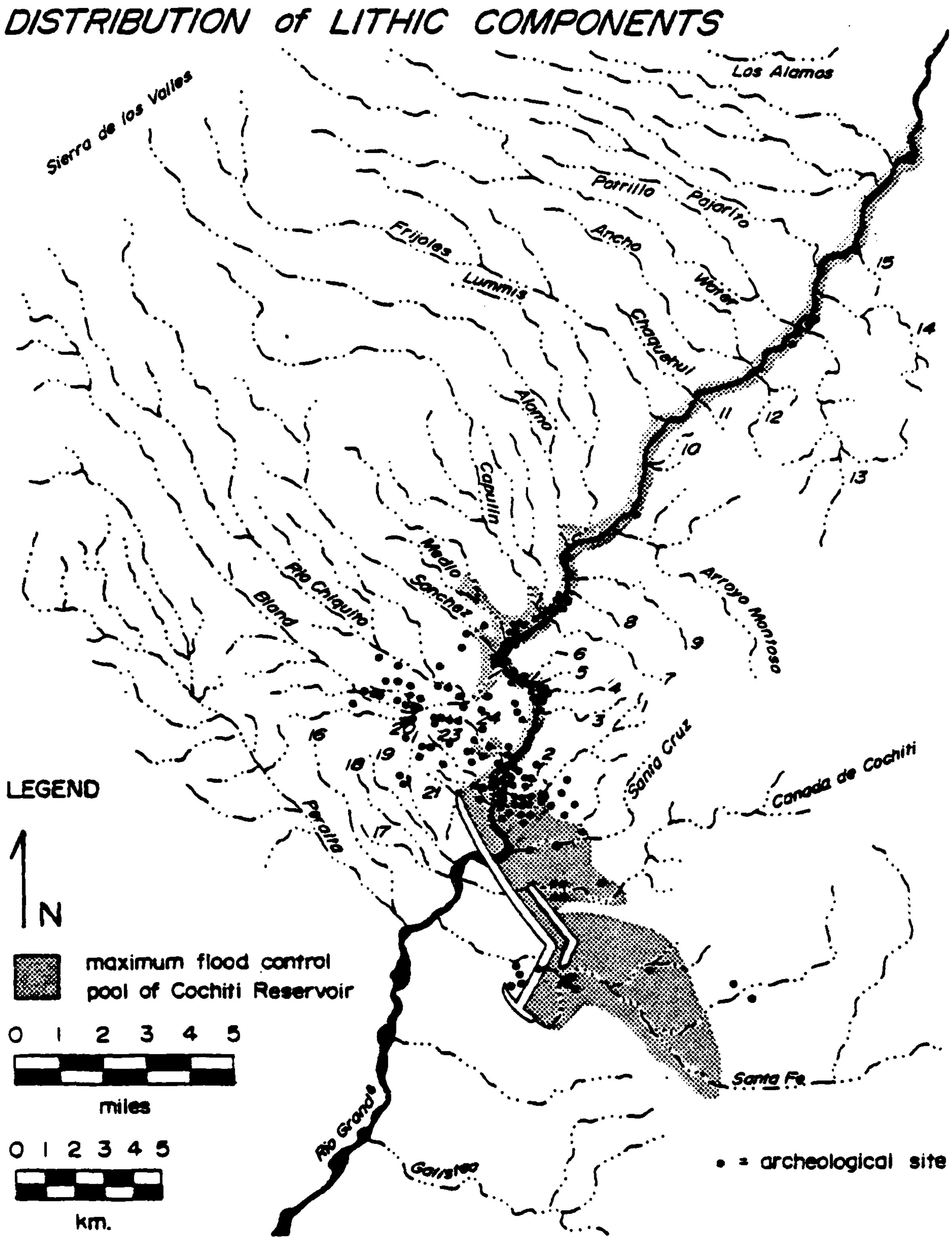


FIG. III.5.1 Distribution of Lithic Components in Cochiti Reservoir and the Cochiti Study Area

itself. "Diagnostic" artifacts from site locations within the project area are generally similar in morphology to those described by Irwin-Williams as dating to the En Medio Phase (800 B.C. - A.D. 400), but such artifacts rarely occur at nonstructural site locations. The degree to which the presence of a single broken artifact should be employed analytically as the sole criterion through which contemporaneity is assigned to site locations is subject to considerable question as well.

A possible means for resolving problems of contemporaneity resides in the fact that the majority of the nonstructural provenience locales exhibit obsidian artifacts. This situation offers a unique opportunity to employ obsidian hydration techniques for relative dating purposes. Such avenues for independently assigning contemporaneity are generally not possible with respect to Archaic Period site locations; because of that, the archeological record of Archaic behavior within Cochiti Reservoir and the study area is potentially capable of providing a *significant* contribution toward refining temporal sequences of Archaic adaptation for the entire Middle Rio Grande region.

2. **Evaluation of Explanatory Models**

A major concern of present anthropological inquiry concerning dynamics of Archaic behavior is that of evaluating the degree to which logistical strategies which articulated subsistence related activities were conditioned or determined by environmental variability. One set of approaches taken in this regard has been predicated upon the assumption that the spatial distribution and seasonal periodicity of food resources within a region comprise a set of environmental parameters which are most effectively coped with by foraging-based adaptive systems through "minimax" strategies dictating choice of site location. A minimax model suggests that specific locations chosen for performance of procurement, processing and consumption of food resources will be those which provide most efficient access to the greatest diversity of food resources. Such spatial locations are posited to minimize energy expenditure (labor investment) in movement of personnel to and from food resources, while maximizing the probability of energy return through providing access to different sets of food resource species.

This explanatory model is compatible with conceptual approaches which view human behavior as an energetically-based adaptive system, and has been suggested to account for particular case examples of archeological site distributions (Plog and Hill 1971, Reher and Witter, in press). Two major problem areas concerning the applicability of this model to the operation of foraging-based adaptive behavior of human populations must be resolved, however, if it is to be rigorously employed for more universal purposes of prediction.

The first of these problems is one of scale. There exists at present no substantial inquiry directed toward delineating the size of spatial frames appropriate for evaluating the operation of minimax strategies as criteria for site location selection across the landscape. In a similar sense, little consideration has been given to determining which measures of structural complexity among food resource species are most appropriate for such evaluation. It is thus unknown at present whether the minimax model can best be used to explain settlement distribution from a regional scale of observation, or from some smaller, subregional scale. It is unknown as well whether food resource diversity should be measured as a set of species associations within a community, a set of communities within a life zone, or as a set of life zones within a region.

Measures of vegetative diversity as species associations within communities have been employed in one case study to predict Archaic site densities (Reher and Witter, in press), but similar measures employed in another case study proved of little predictive value (Allan *et al.* 1975). The degree to which either of these studies resulted in documentation of an essentially fortuitous positive or negative covariation of site density and food resource diversity can only be assessed through rigorous examination of the kind and scale of measurements employed.

A second problem which must be addressed in this regard is that ascertaining the degree to which *volume* and *predictability* of food resources function as determinants of settlement strategy. Clear documentation of the procurement of a limited number of focal species has been observed for many human adaptive systems both archeologically and ethnographically. Such focal economies have been predicated upon the existence of faunal food resoruces (such as herding ungulates, anadromous fish, etc.) whose productivity or behavior is highly predictable, and which can be procured in great volume. Variability in volume and predictability among floral resources serving as the subsistence base of broad spectrum foraging adaptive systems must certainly be taken into account before diversity *per se* can be employed as a warranted measure of food resource availability for purposes of explanation.

Archaic site locations within the project area offer considerable potential for evaluating different measures of environmental variability, and the conceptual models underlying those measures, with respect to their overall utility for explaining interrelationships between adaptive behavior and the structure of food resources within a region.

The study area encompasses three major life zones (Upper Sonoran, Transition and Canadian) and eleven vegetative communities (see Drager and Loose, this volume). Detailed botanical studies within one of these vegetative communities has resulted in definition of at least seven vegetative associations (see Tierney, this volume). The project area itself is situated at the interface of three major environmental zones defined by physiographic and vegetative structure. These major zones include the Pajarito Plateau to the west of White Rock Canyon which is characterized by extreme diversity in elevation, physiography and vegetative structure; the Cerros del Rio Plateau to the east of the canyon, which is characterized by a general uniformity of physiographic and vegetative structure; and the Middle Rio Grande Valley proper to the south of White Rock Canyon, which supports an extensive riparian vegetative community.

Although considerably less previous research is available for documentation of faunal species within the study and project areas, preliminary evidence suggests that the project area is situated at the interface of a great diversity of faunal habitats as well (see Marchiando, this volume).

Survey of the permanent and flood control pools has resulted in documentation of 121 nonstructural proveni-

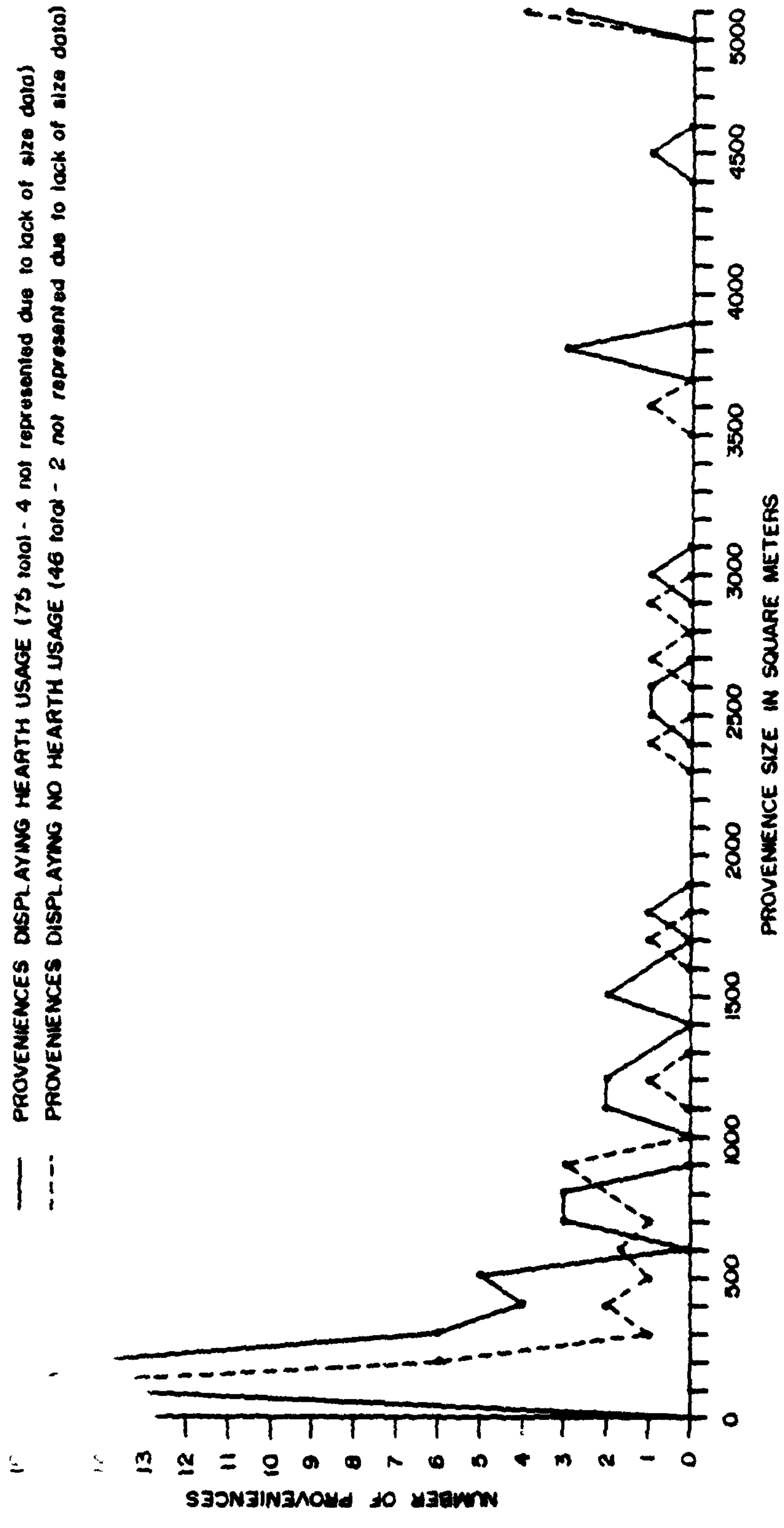


FIG. III.5.2 Lithic Density versus Provenience Size for Nonstructural Proveniences in Cochiti Reservoir

ences at 90 site locations, many of which can be provisionally assigned to the Archaic Period. These provenience locales are characterized by considerable diversity in size and content. Evidence of consumption of food resources is apparent at 75 (or nearly 62 percent) of these proveniences as hearth facilities (50 proveniences), or firecracked rock scatters (23 proveniences). The areal extent of artifactual debris associated with proveniences exhibiting hearths or firecracked rock ranges from ca. 16 square meters to 12,500 square meters, and the number of hearth facilities, where present, range from one to 10 per provenience. A range of behavioral factors, including group size, composition, recurrence of occupation or technology of preparation for consumption could be suggested as possible determinants of such variability.

Considerable variability in processing activities is indicated as well through the kind and density of lithic artifactual remains comprising nonstructural provenience locales. Only three proveniences were not characterized by evidence of tool utilization within sample areas documented. The relative frequency of utilized tools within the other proveniences ranged from 2% to 71%, while the estimated density of lithic artifacts ranged between 0.01 and 179.0 artifacts per square meter. In general, artifact densities greater than 10 artifacts per square meter represent very small concentrations of debitage within some portion of a provenience locale which were monitored during survey. The majority of proveniences exhibited densities varying between 0.1 and 5.0 artifacts per square meter.

Milling activities, represented by manos or metates, were evident at 26 provenience locales, and processing activities necessitating usage of massive implements such as choppers were evident at 25 locales. Only four proveniences exhibited both milling implements and choppers. Fifty percent of proveniences characterized by hearth usage exhibited either milling implements or choppers, while 34% of proveniences characterized by no evidence of hearth usage exhibited such implements.

Direct artifactual evidence of procurement activities is difficult to define, in that it can be expected that actual use of tools or facilities to acquire food resources may have been undertaken in areas other than site locations themselves. Indirect monitors of kinds of resources procured, however, can be suggested through examination of processing implements comprising the artifactual assemblage of site locations. Nonartifactual evidence of procurement can be sought as floral or faunal remains within site locations where processing or consumption of food resources was undertaken. Although this latter kind of evidence is generally not retrievable through survey, it can be recovered through excavation.

The kinds of variability exhibited among nonstructural proveniences of site locations within the study area can be productively employed as data to examine several very critical explanatory concepts which have been proposed to account for Archaic adaptive behavior in arid environments. Significant problem areas which can be approached in this regard include 1) evaluating the degree to which food resource volume, predictability or diversity operate as determinants of Archaic settlement strategies; 2) assessing the appropriate spatial and structural scales through which vegetative and faunal resources should be defined as units of observation for purposes of explaining strategies of subsistence related behavior within a region; and 3) refining presently limited knowledge concerning temporal sequences of Archaic adaptation within the Middle Rio Grande region.

Anasazi Foraging Behavior

The procurement of nondomesticated floral and faunal resources by Anasazi populations has been commonly recognized in previous research, but has been rarely treated as a variable in modeling the structure and organization of Anasazi adaptive behavior in the Middle Rio Grande region. While some published analyses suggest that such procurement strategies have provided critical buffering resources for agriculturally-based economies (Bohrer 1970), and direct evidence of dietary importance of nonagricultural foodstuffs has been documented through excavation of Anasazi site locations within the study area (Lange 1968), few attempts have been made to intensively examine this aspect of Anasazi subsistence.

It has instead been implicitly assumed that the overall logistical strategies dictating site size, location and performance of subsistence related activities by Anasazi populations were solely conditioned by environmental variability related to agricultural potential. An underlying, and equally implicit tenet of this view can be posited as the assumption that nondomesticated food resources within an arid environment are incapable of supporting large, aggregated centers of human population. The validity of these assumptions has not been seriously examined.

Previous archeological research within the study area has resulted in description of 31 nonstructural site locations as dating to the Anasazi Period. This assignation has been made only in cases where substantial frequencies of ceramic fragments were present, and nonstructural site locations exhibiting either very few or no ceramic fragments have generally been classified as "Archaic" or "Lithic Unknown" Period manifestations. Survey of the Cochiti Reservoir permanent and flood control pools documented a total of 35 nonstructural proveniences of 35 site locations which exhibited ceramic fragments, but of these only seven were characterized by 10 or more sherds.

A major problem must be addressed before the presence or relative frequency of ceramic fragments can be warranted as data to assign the deposition of a site or provenience locale to the Archaic or Anasazi Periods. This concerns the degree to which ceramic vessels should be expected to comprise a part of the technological inventory of tools and facilities routinely employed to procure, process or consume food resources at such loci. If nonstructural sites represent short-term, seasonally occupied locations at which nonagricultural food resources are processed or consumed by members of cultural systems whose technological inventory includes ceramic vessels, should it be expected that such vessels would necessarily be employed at those locations?

It can be suggested that this problem can be approached initially through developing a means of assigning contemporaneity to nonstructural site locations which is not dependent upon ceramic taxonomy. As discussed previously, obsidian hydration analysis may prove very productive in this regard.

If nonstructural proveniences or site locations within the study area can be demonstrated to date to the operation of one or more phases of Anasazi adaptive behavior, research can be directed toward ascertaining if, and the

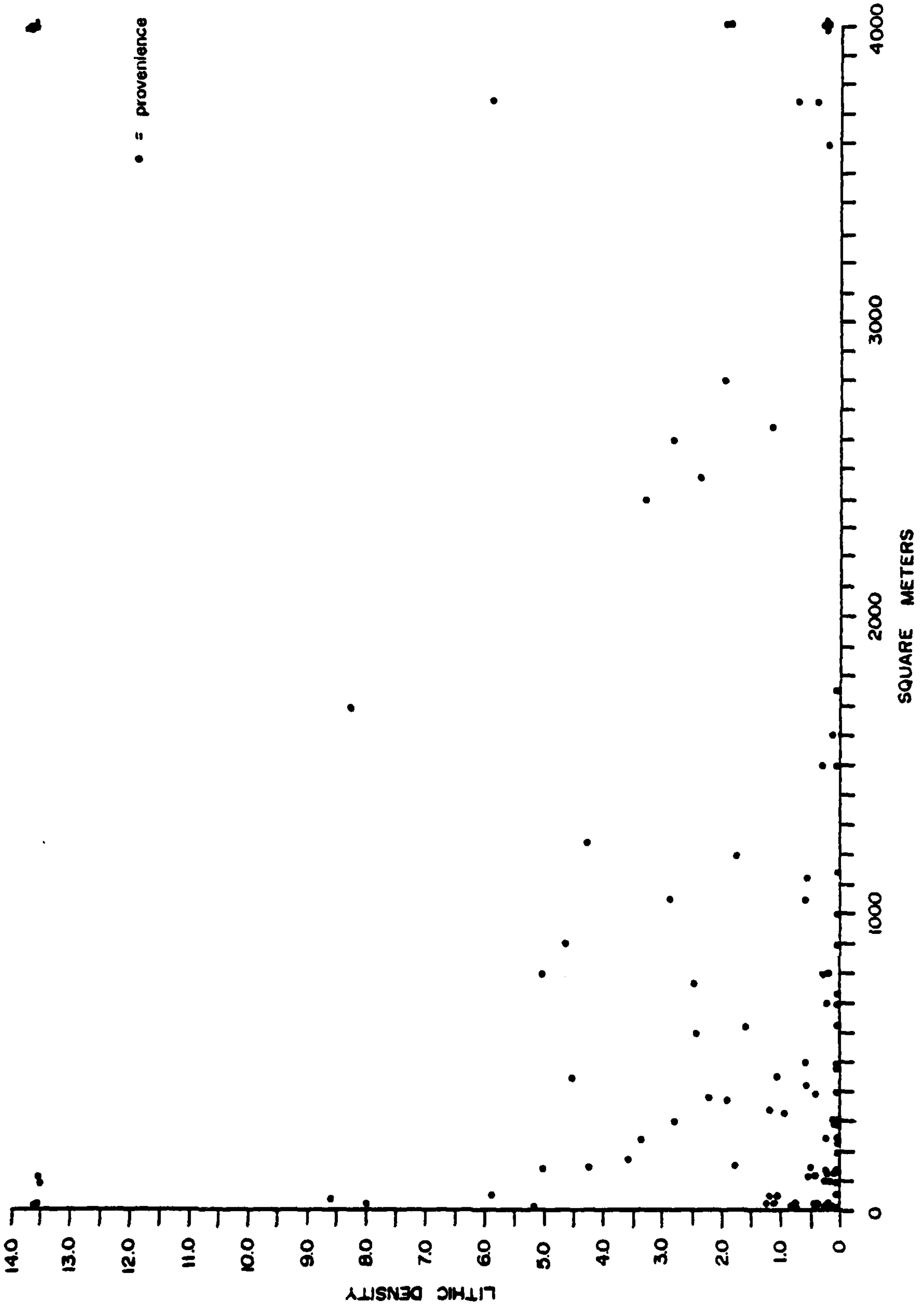


FIG. III.5.3 Provenience Size Variability for Nonstructural Sites in Cochiti Reservoir

degree to which, they represent procurement, processing and consumption of domesticated food resources. Specific research problems which can then be addressed include evaluating the degree to which the distribution and structure of floral and faunal food resources conditioned overall strategies of Anasazi settlement within the study area, and the degree to which apparent changes in settlement and land utilization for agricultural production evident between the P-III and P-IV phases of the Anasazi Period may have been conditioned in part by increasing investment into nonagricultural food procurement.

AGRICULTURALLY-BASED ADAPTIVE SYSTEMS

Past archeological research (Wendorf 1954; Hewett 1953; McGregor 1965) has indicated, beginning ca. A. D. 600, that the production of domesticated food resources plays an increasingly important role in the overall structure and organization of adaptive behavior in the Middle Rio Grande. Seasonal mobility of the human populations across ecological zones appears to have become considerably reduced, while labor investment into the construction of habitation, storage and agricultural facilities increased through time. The strategy of settlement appears to be successively less conditioned by location and periodicity of nondomesticated food resources and successively more conditioned by soil, physiographic and climatological variability affecting agricultural productivity. The technological character of extractive, productive and consumptive behavior reflects a gradually increasing dependence upon agriculturally produced and stored food resources.

Previous explanations for these adaptive changes in the Middle Rio Grande have generally centered upon reference to immigration of human populations from the Chaco Canyon, Mesa Verde or Zuni areas (Hewett 1953; Wendorf 1954). Explanatory models of a more universal nature, however, have been proposed to account for adaptive changes of the kind observable within the Middle Rio Grande and the project area (Binford 1968; Flannery 1968; Glassow 1972; Zubrow 1972). It is felt that these models offer a more productive avenue of research and will serve as a base from which the significance of Anasazi Period site locations will be assessed.

Shift from Foraging to Agricultural Strategies of Adaptive Behavior

Toward the end of the Archaic Period, domesticates in the form of corn and possibly beans and squash, were introduced into the Middle Rio Grande area. The exact date of this introduction has not yet been established but sites with evidence of cultigens have been documented in southern New Mexico as early as ca. 3900 to 3000 B. C. (Dick 1965:95). There is increasing evidence that the first production of domesticates did not result in an immediate shift in the character of adaptation. Rather, the seasonally mobile generalized foraging strategy suggested for the Archaic Period appears to have continued with little change; cultigens were simply added as an additional food resource.

At a later point in time, ca. A. D. 600 in the Middle Rio Grande (Wendorf 1954), a period of change in the character of the archeological record has been documented. While the dynamics of this change are poorly understood at present, site locations reflect an investment into the construction of architectural facilities, including habitation and storage structures, and technological changes which include the manufacture and use of ceramic vessels. It has generally been assumed that these changes reflect a growing dependence upon the production of cultigens with a shift in settlement strategy which involves the establishment of permanent or semi-permanent habitation locales.

Few sites which date to this time period, the Early Developmental, ca. A.D. 600-900 (Wendorf 1954), have been documented within the Middle Rio Grande. These sites are generally characterized by shallow semisubterranean structures (pithouses?) which are extremely difficult to identify from surficial remains. In fact, often Early Developmental phase sites are not characterized by surficial architectural manifestations (Wendorf 1954). Artifactual debris is frequently limited to lithic assemblages and a few brown or gray ware ceramics. One set of sites south of the Cochiti study area may be among the first to reflect this shift. These sites have been intensively examined (Rinehart 1967). Any expectations for modeling the shift from foraging to agriculturally-based subsistence behavior for the Middle Rio Grande is presently derived from other studies in the Southwest (Brew 1946; Eddy 1966; Glassow 1972; Morris and Burgh 1954) or elsewhere in the world (Binford 1968; Flannery 1968; Zubrow 1972). A series of proveniences documented during the surveys of Cochiti Reservoir, however, have the potential of adding new information about this shift in adaptive behavior

Seventeen proveniences from 12 site locations were characterized by possible pithouse depressions, a few associated surface structures, and extremely low densities of lithic artifactual debris. Although depression features have been documented in the Middle Rio Grande from Early Developmental to Classic phases, the scarcity of artifactual debris suggests the possibility of earlier deposition, especially in light of Rinehart's (1967) work.

Although a few of these depression features are located in White Rock Canyon, the majority are situated along the southern bank of the Santa Fe River. Based upon Ramage's arable land stratification (this volume), the Santa Fe River area is characterized by large continuous tracts of Class I lands and hence might be one of the first areas expected to be settled by early agriculturalists (Glassow 1972). These sites are also situated, from a regional perspective, in close proximity to the ecological diversity of the Pajarito Plateau. Thus they may reflect optimal ecotonal locations for both the production of cultigens and the procurement of nondomesticated food resources.

In view of the lack of information concerning the Early Developmental Phase in the Middle Rio Grande, these site locations have the potential for providing significant information about the dynamics of this adaptational period. This potential may be manifest in elucidating specifics of change for the Middle Rio Grande *per se*, through providing better established dates for this shift in adaptation or information concerning the seasonality of occupation; or these sites may provide information of a more general processual nature concerning the shift from a seasonally mobile foraging strategy to a more sedentary strategy of the production of food resources as a world-wide phenomenon.

Sedentary Agricultural Systems

It has generally been implied or assumed that by or during the Late Developmental Phase in the Middle Rio

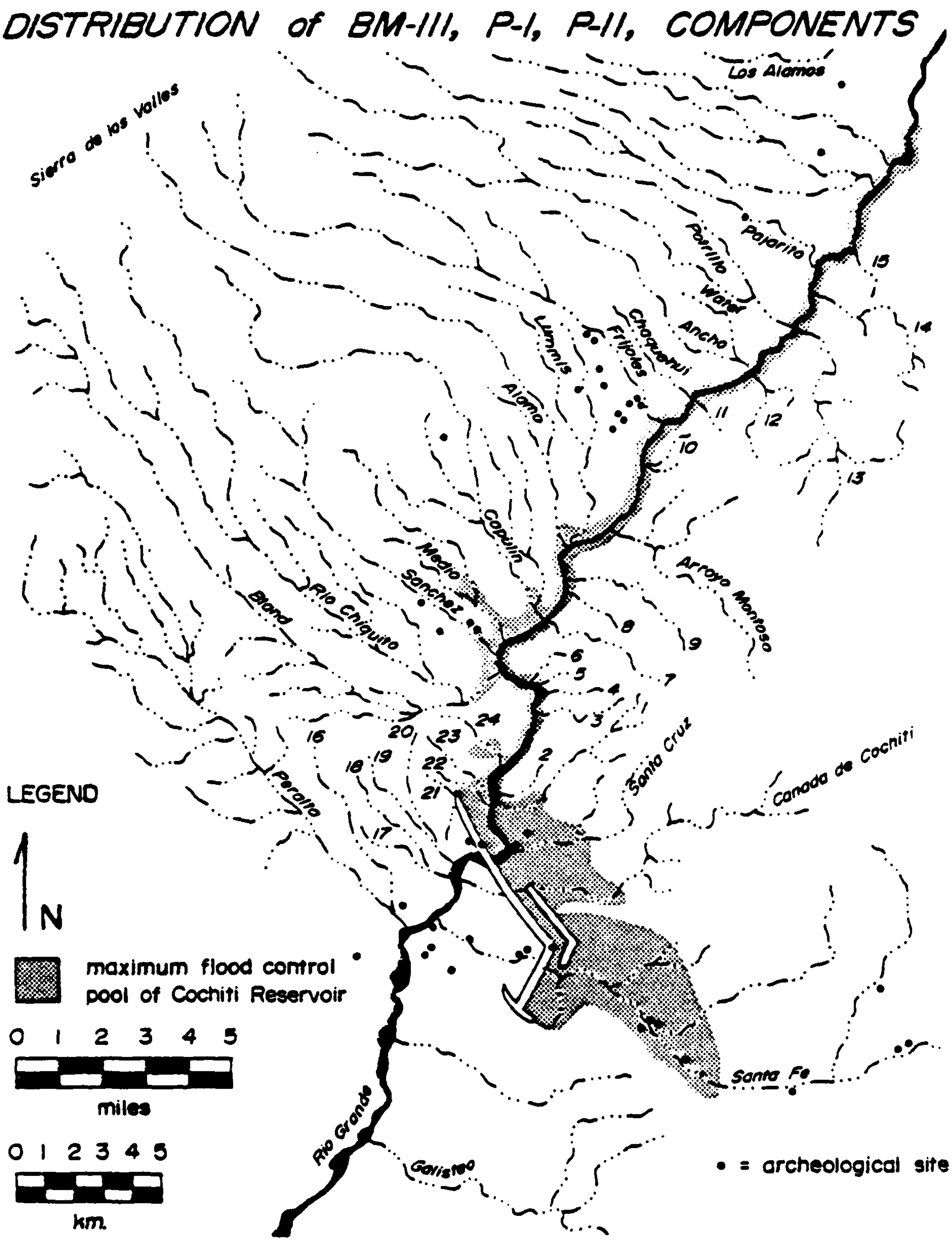


FIG. III.5.4. Distribution of BM-III, P-I and P-II Components in Cochiti Reservoir and the Cochiti Study Area

Grande, ca. A. D. 900-1200 (Wendorf 1954), that the shift to a predominantly agriculturally-based economy had taken place. No substantial attempts have been made, however, to summarize or examine the character of sedentary agricultural adaptive behavior for the Middle Rio Grande. The following discussion will attempt such a summary through outlining variability in the kind and distribution of site locations dating to the Late Developmental (P-II), Coalition (P-III) and Classic (P-IV) phases of the Anasazi Period. Information which this variability provides about processes of adaptation and change through time will be treated where appropriate.

1. **Late Developmental or P-II phase (ca. A.D. 900-1200)**

Only 34 Late Developmental site locations have been documented for the study area. These sites exhibit considerable variability in manifestation ranging from lithic and ceramic scatters to sites of one to three pithouse structures to a component of an estimated 500 room pueblo. Late Developmental site locations are distributed intermittently throughout the study area, predominantly on mesa tops in the Pajarito Plateau and along the banks of the Santa Fe and Rio Grande Rivers below the mouth of White Rock Canyon. It is interesting to note that single component P-II site locations are rare; they are frequently associated with the earlier BM-III or P-I components or later P-III components. In general, the latter reflect the larger site locations and the former the smaller nonstructural and structural site locations.

The frequency and distribution of Late Developmental site locations appear to reflect a "marginal" use of the study area and are consistent with the low density of documented Early Developmental site locations in the study area. The lack of information concerning the character of adaptation during this phase (the degree of dependence upon agricultural rather than nondomesticated food resources; the duration of occupation or seasonality of occupation, and so on) parallels the lack of information for the Early Developmental phase. Unfortunately, sites which date to the Late Developmental were not encountered during the surveys of Cochiti Reservoir, although several pithouse structures from LA 6461 and LA 6462 were excavated in the adjacent Cochiti Dam project area. This lack of documented site locations for the reservoir area serves to emphasize the restricted distribution of Late Developmental site locations in contrast to the nearly ubiquitous distribution of the subsequent P-III and P-IV phase sites.

2. **Coalition or P-III Phase (A.D. 1200-1325)**

Beginning with the Coalition or P-III phase is the first evidence of a substantial or high density occupation within the study area. Three hundred sixty-three site locations have been documented which exhibit P-III components. Of these, 268 are characterized by architectural structures; eight are nonstructural lithic and ceramic scatters; two are characterized by rockshelters, and descriptive site information for 85 locations was not available. The structural site locations exhibit a range in size from one to 500 rooms and are widely distributed throughout the study area. The P-III phase of sedentary agricultural adaptation is thus characterized by a dramatic increase in number of site locations and total number of rooms over the preceding Developmental phases. Considerable variability in site size, as monitored by number of rooms, at each site location is exhibited as well.

A major analytical problem which has not been resolved through previous research is that of explaining the seemingly "sudden" population increase represented by P-III component sites. Hewett (1953) suggested that the high density of P-III site locations within the Pajarito Plateau resulted from a slow population immigration throughout the entire P-III phase. More recently, Dickson (1975) has suggested that the increase in numbers of early P-III site locations for an area nearly adjacent to the study area in the Middle Rio Grande region could be accounted for by indigenous population growth. Both these explanations were not based, however, upon adequate knowledge of the actual number and distribution of documented P-III components throughout the Pajarito Plateau or Middle Rio Grande region. Evaluation of these alternative hypotheses is difficult for two reasons, largely due to a paucity of data derived from the excavation of sites.

Specific variability in the character of P-III adaptation to the Middle Rio Grande region and the study area, in particular, is very poorly documented. While excavated data can be used to suggest that agricultural production of maize provided a substantial portion of the food resource base of the P-III populations (Lange 1968), the logistical strategies articulating production, processing and consumption of cultigens have not been isolated. It is not known at present whether these logistical strategies involve a high or low degree of seasonal population movement and construction of habitation and storage facilities at different site locations for purposes of production versus consumption. Further, technological specifics of agricultural production remain largely unknown for the P-III phase and the degree to which production technology and climatic variation necessitated periodic population relocation across the landscape cannot be posited.

Many questions directed toward isolating the logistical structure of P-III adaptive behavior must be approached before informed explanatory statements accounting for the large numbers of P-III components as "indigenous population growth" or "slow immigration" can be postulated. Previously documented survey and excavation data, however, can be employed to suggest a rudimentary outline for the directions such research might profitably take.

Characteristics of P-III components which distinguish that phase of adaptive behavior from the earlier Developmental phase and the later P-IV phase are the relatively greater numbers of site locations exhibiting P-III components, relatively greater numbers of architectural facilities constructed, and extreme variability in size of components, as monitored by numbers of rooms comprising architectural facilities. It is felt that three possible determinants of the differences must be explored in order to offer explanatory hypotheses for this observed variability.

1. The nature of articulation of individuals into socioeconomic subsistence "units" which cooperate in the production and consumption of agricultural food resources must be defined.

Data from excavation of LA 6462 (Bussey 1968) suggest that three kinds of architectural facilities were constructed during the P-III phase of occupation of the site. These include surface habitation rooms, defined by the presence of hearths; surface storage rooms, defined

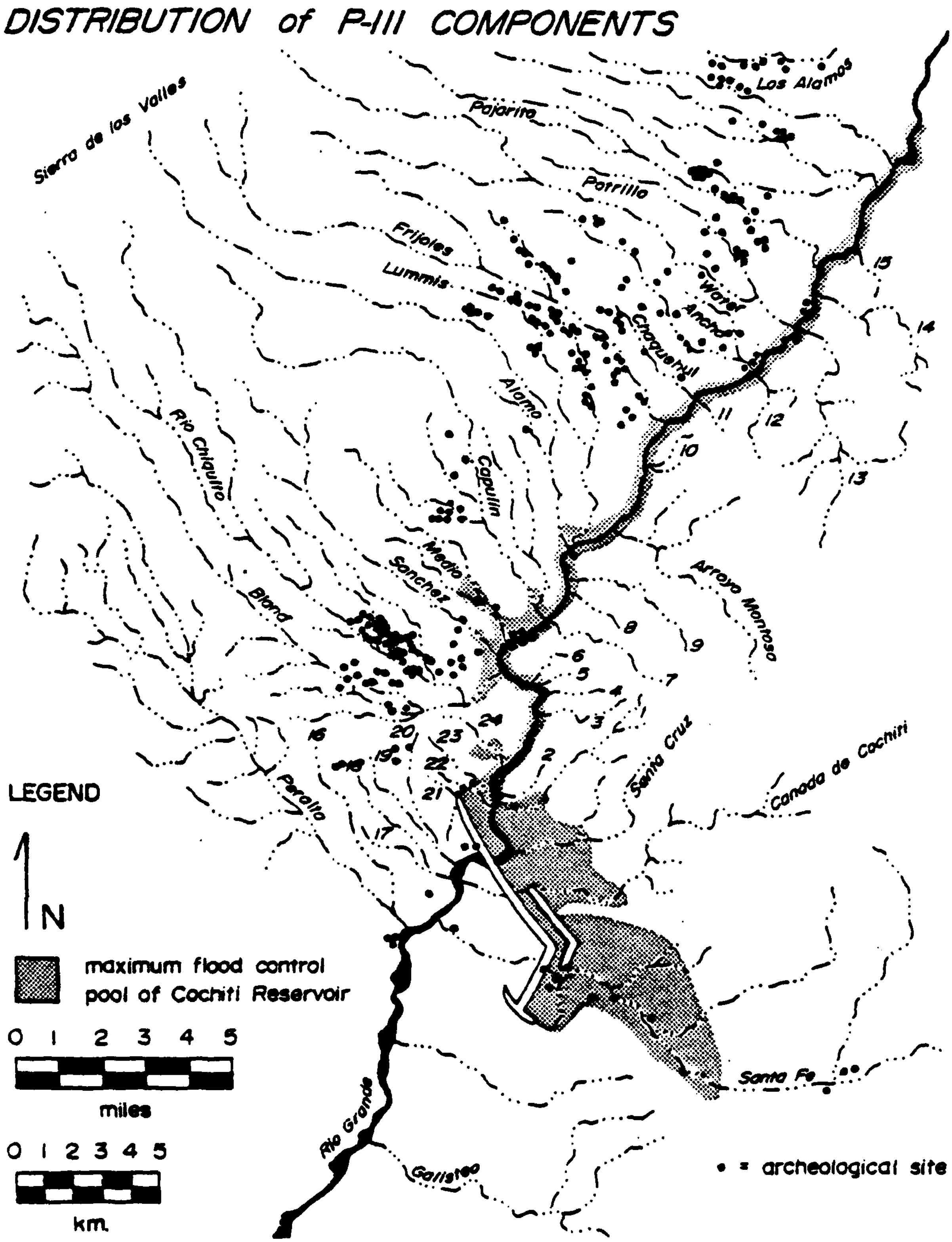


FIG. III.5.5 Distribution of P-III Components in Cochiti Reservoir and the Cochiti Study Area

by the absence of hearths; and kivas, defined as semi-subterranean structures containing hearths.

Four spatially distinct architectural units comprised of contiguously constructed habitation and storage rooms were defined through excavation of LA 6462, each of which were situated in close proximity to a kiva. Each architectural unit was comprised of three to six habitation rooms and four to 14 storage rooms. Ratios of habitation to storage rooms varied from 1:1 to 1:2.7 per roomblock unit.

If data from LA 6462 are assumed to be representative of other P-III architectural components within the study area, it can be suggested that basic social and economic components of the P-III adaptive system were households comprised of three or more commensal units which co-operated in the production and consumption of food resources. A well-defined structure of social integration among commensal units comprising each household is implied through the presence of associated kivas. The close spatial proximity of four such households at LA 6462 suggests that mechanisms existed through which these households were articulated into larger social and economic components.

It seems entirely possible that much diversity in the size of P-III components (as monitored through numbers of architectural facilities at site locations) might thus be accounted for through conditions under which lesser or greater numbers of household components would be expected to interact cooperatively for economic purposes.

2. A second possible determinant of variability in site size and numbers of site locations exhibited during the P-III phase resides in the degree to which food resource production and procurement strategies necessitated seasonal population movement between site locations during the course of a year. If such strategies involved seasonal habitation of architectural facilities nearby field areas for purposes of agricultural production during the growing season, and subsequent habitation at different site locations during the winter months, the total number of site locations exhibiting P-III components would be greater per unit population than if architectural facilities were constructed at only a single site location. The same strategy would be expected to result in greater diversity in site sizes as well.

3. A third possible determinant of numbers and sizes of site locations dating to the P-III phase resides in the degree of population relocation across the landscape necessitated by the interaction of climatic variability and production technology through the 125 year period of P-III adaptation to the region. There exist at present no means to stratify P-III components into temporal "sub-phases," with the result that changes in settlement strategy characterized by periodic population relocation and architectural construction cannot be isolated. If such means could be developed, changes through time in settlement patterning and site size might be delineated which would provide insight into the nature of adaptive process now obscured by lack of temporal control.

The eleven single component P-III site locations and the 13 multicomponent P-III/P-IV site locations documented within Cochiti Reservoir offer the potential of significant insight into the nature of sedentary P-III agricultural adaptation within the study area. Some of the variability in size of P-III components, as monitored by the number of rooms, is reflected in the P-III site locations documented in the reservoir. Only "large" site locations, those in excess of 30 rooms, are absent in the project area. An intensive examination of LA 5014, a single component P-III site comprised of an estimated 12 to 17 rooms, would yield data particularly informative about the social and economic articulation of population segments at medium-sized site locations, those exhibiting between 10 and 30 rooms, which seem characteristic of only the P-III phase within the study area (see Section III, Chapter 1). Further, a detailed examination of this site has the potential to provide information concerning the duration of occupation (permanent vs. seasonal) and the range in activities performed. An investigation into small structural site locations, sites which exhibit between one and five rooms, offers a similar potential. In particular, are these smaller site locations representative of a seasonal "field house" occupation or do they reflect a series of activities ranging from permanent habitation structures to seasonal procurement or production stations? In addition, all P-III site locations within the reservoir offer potential for developing more sensitive relative or absolute temporal control within the 125 year span of P-III phase adaptation throughout the region.

3. Classic (P-IV) Phase A.D. 1325-1600

While the P-IV phase of sedentary agricultural adaptation spans 275 years, the majority of P-IV sites located in the study area are characterized by Glaze A and B ceramic fragments which date in manufacture between A. D. 1325-1450. A total of 233 site locations exhibiting P-IV components have been previously recorded within the study area with an additonal 89 site locations documented during the surveys of Cochiti Reservoir. These site locations are found in the Upper Sonoran and Transition Life Zones and in seven of eleven vegetative communities.

The number, kind, size and distribution of P-IV site locations suggest several distinct differences in the character of adaptation between the P-III and P-IV agriculturally-based systems. The first of these differences resides in an apparent reduction of total population inhabiting the study area from the P-III phase to the P-IV phase. This is reflected in a decrease in total components from 363 during the P-III phase to 233 in the P-IV phase and a reduction in total number of rooms from 2972 in the P-III phase to 2587 in the P-IV phase (see Table III.1.3 in Chapter III.1).

The second of these differences resides in an apparent change in settlement strategy reflected in the distribution of site sizes. While site locations exhibiting P-III and P-IV phase components range in size from one to 800 rooms, only one or 0.7% of the single component P-IV sies exhibits between 11-30 rooms. Where the P-III sites seem to reflect high counts of small, medium and large sites, a distinctly bimodal size distribution of small and large sites characterized the P-IV settlement strategy.

The third of these differences resides in an increased variability in kinds of site locations exhibiting P-IV components. While both P-III and P-IV sites are predominantly characterized by structural sites, more P-IV components are represented by nonstructural lithic and ceramic scatters and open, nonstructural agricultural facilities including terraces and dams. During survey of the Cochiti Reservoir, three constructed trails were also encountered. Both of these were characterized by "trail-side" scatters of Glaze A, B and C ceramics, which suggests that they were used, although not necessarily

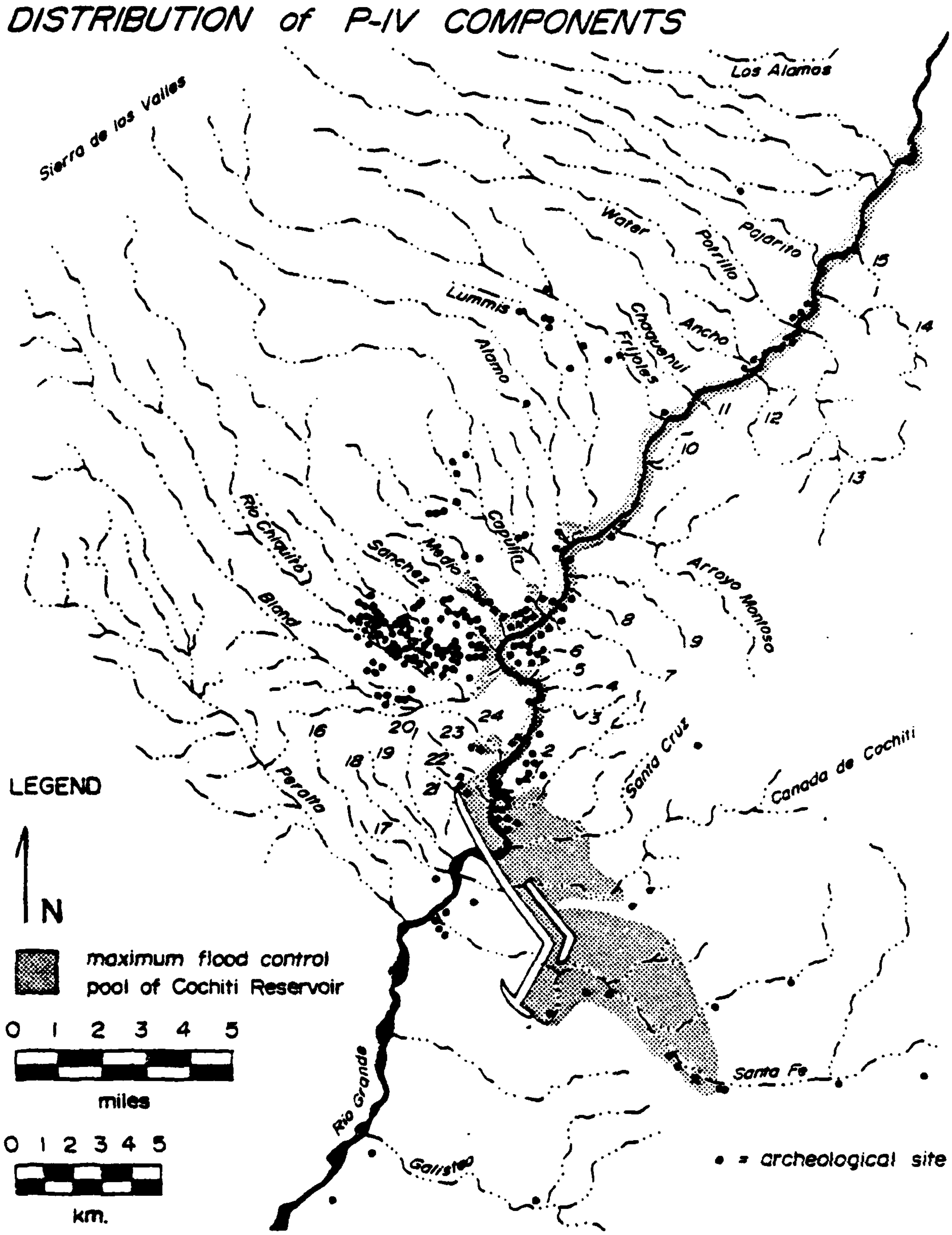


FIG. III.5.6 Distribution of P-IV Components in Cochiti Reservoir and the Cochiti Study Area

constructed during the P-IV phase as well. Additional features similar to prehistoric Chacoan roads were observed from aerial photography within the study area, but their ground truth has not been assessed at this writing (Loose, personal communication).

Several implications concerning change in the structure and organization of adaptive behavior within the study area between the P-III and P-IV phases can be suggested for these data. These include a shift toward increasing investment in procurement of nonagricultural food resources which is reflected through substantially greater numbers of nonstructural site locations exhibiting P-IV components. Twenty-three such P-IV site locations have been previously recorded within the study area: 9 nonstructural site locations which exhibited high frequencies of ceramics and 20 more with low numbers of P-IV ceramics were documented within the project area during surveys of the Cochiti Reservoir. In the project and study areas only 10 open sites exhibited P-III phase ceramics in low frequencies.

A shift toward intensification of labor investment into food resource production is apparent in the construction of agricultural terrace facilities during the P-IV phase. A total of seven single component and three multi-component P-IV terraces have been previously recorded witin the study area, while only two terraces exhibiting P-III components have been documented. A minimum of 10 terraces were recorded during intensive surveys of the project area, which exhibited P-IV ceramic fragments, suggesting their use during that phase.

The P-IV settlement pattern reflects a two-fold strategy of population aggregation in large centers, and apparent dispersal across the landscape at small one to three room site locations. This patterning of settlements is considerably different from the P-III phase strategy, in which the majority of site locations exhibited between six and 30 rooms.

While the processes underlying changes in food resource procurement, production and settlement strategy between the P-III phase and the P-IV phase are unknown at present, they seem to have resulted in a much more highly organized system of social and economic behavior in the latter phase. Several specific problem areas concerning this adaptive change can be posited as productive lines of research resulting in its explanation.

1. One direction research should take is isolation of the structure and socioeconomic articulation of population segments during the P-IV phase. Data from two excavated sites, LA 6455 and LA 70, suggest that little change in the structure of households occurred between the P-III and P-IV phases. The Western Sector of LA 6455 was constructed and inhabited during the P-IV phase (Lange 1968) and was comprised of a single roomblock of 11 habitation rooms and 15 storage rooms. Two kivas were associated with the roomblock. While no data concerning room function are presently published for LA 70, the Glaze A component at that site was comprised of 96 rooms and eight kivas, while the Glaze B to Glaze C component was comprised of 93 rooms and seven kivas (Warren 1974). The ratio of rooms per kiva for all three of the above P-IV components thus ranges from 12 rooms per kiva to 13.2 rooms per kiva. This is quite similar to the average of 12.5 rooms per kiva found for households comprising LA 6462, a phase site previously discussed.

It can be suggested from these data that the structure of household composition is quite similar throughout the P-III and P-IV phases. Households of four to six commensal units which cooperated in the production, storage and redistribution of food resources seem to comprise minimum components of the social and economic system.

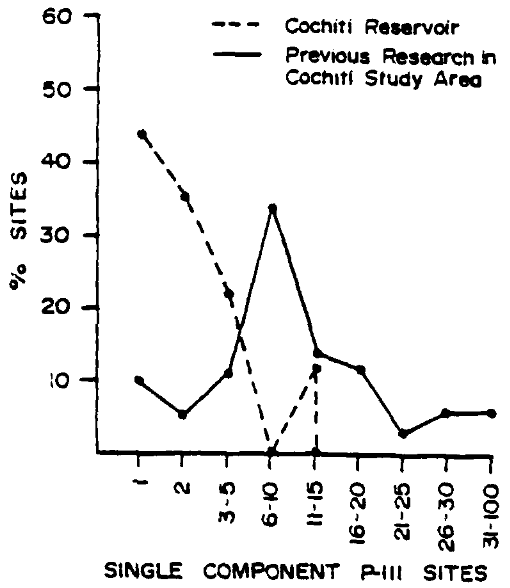
A much more highly organized articulation of these components is indicated, however, in the inter-household organization of labor for contiguous habitation construction, and in the relatively greater numbers of households comprising large settlements themselves. The degree to which the existence of such large population centers during the P-IV phase reflects a more highly organized social and economic articulation of households for purposes of food resource redistribution and exchange of other goods and services cannot be definitively stated at present. Possible evidence of such organization can be suggested from the construction of trails and agricultural terrace facilities during the P-IV phase. Such construction may have been undertaken as public work projects necessitating labor contributed by members of many households within administrative contexts transcending short-term social and economic interaction among households.

2. A second direction research can profitably take is that of isolating the degree to which the P-IV settlement strategy reflects seasonal population movement for purposes of food resource procurement and production. The bimodal distribution of site sizes may reflect seasonal dispersal of population across the landscape at small open and one to three room site locations for purposes of agricultural production and nonagricultural food resource procurement during the late spring, summer and early fall, and subsequent aggregation at large population centers after the growing season. This kind of seasonal population dispersal and aggregation, if characteristic of the early P-IV settlement strategy, would reflect a great degree of specialization in resource procurement and production, and a more highly organized articulation of subsistence-related behavior than apparent during the P-III phase.

Eighty-nine site locations documented during survey of Cochiti Reservoir exhibited 104 provenience locales characterized by P-IV components. Twelve proveniences were nonstructural (although an additional 20 nonstructural proveniences exhibited between one and four P-IV sherds); 44 were single room structures; 24 were characterized by two rooms; six exhibited three rooms; four exhibited four or more rooms; and eight were terraces. The remaining proveniences were rubble mounds, isolated walls, slab foundations or rockshelters.

These sites are protentially informative about many aspects of the P-IV adaptive system. Small structural and nonstructural open sites comprise an aspect of P-IV adaptive behavior which has not been previously studied in any systematic fashion, and their potential significance in uderstanding the kinds of subsistence related behavior undertaken at them in relationship to subsistence behavior undertaken at large population centers during the P-IV phase is considerable.

3. A third direction research concerning the P-IV phase adaptation can take is that of isolating processes underlying change in the organization of adaptive behavior apparent during the phase. Such research should focus in part upon documenting climatic parameters condition-agricultural production during the P-III and P-IV phases in order to posit the overall productive potential of the



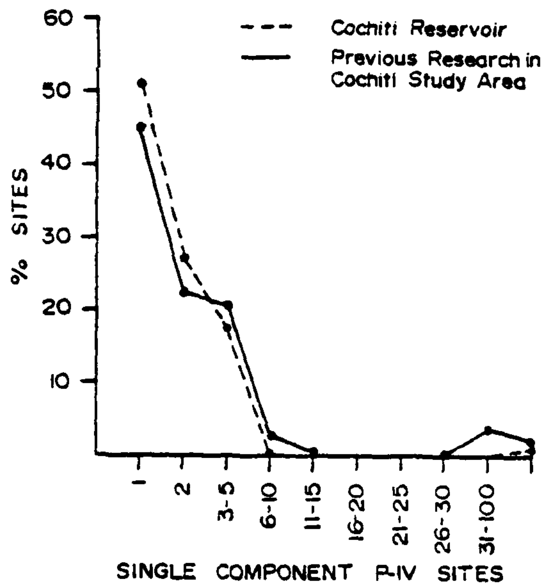


FIG. III.5.7 Room Count Variability for Sites in Cochiti Reservoir versus the Cochiti Study Area

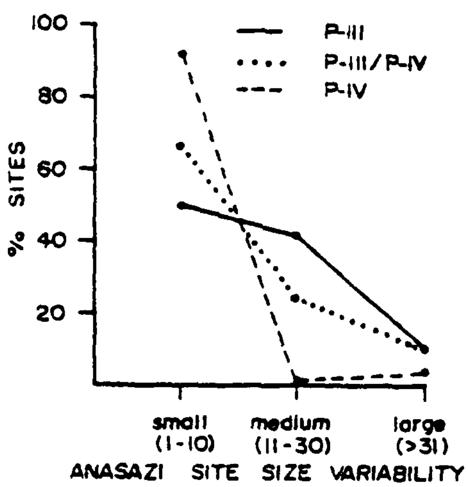


FIG. III.5.8 Room Count Variability for Sites in Cochiti Reservoir and the Cochiti Study Area

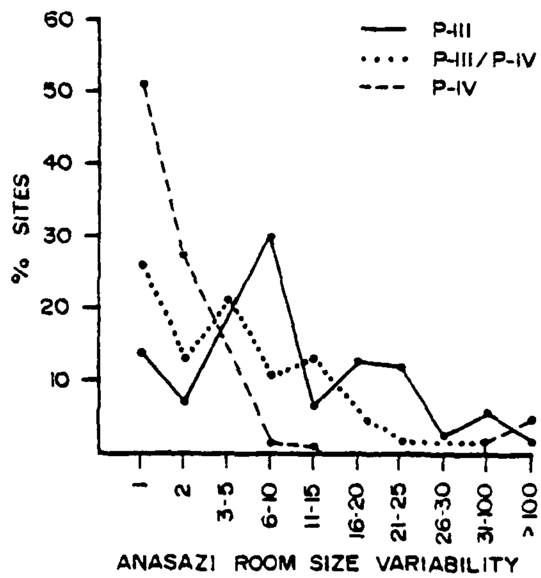


FIG. III.5.9 Site Size Variability for P-III, P-III/P-IV and P-IV Phase Sites in Cochiti Reservoir and the Cochiti Study Area

study area and the region through time, given specific agricultural production technologies. Such procedures could result in isolating the degree to which change in the organization of subsistence related behavior, and change in the technology of production were adaptive responses to a changing environment, or were conditioned by other parameters.

Especially critical in this regard is determination of when organizational changes apparent in the P-IV adaptive system were initiated. Fully eight of the 20 large site locations exhibiting P-IV components are characterized by P-III components as well. It is thus possible that processes underlying the P-IV settlement strategy were initiated during the latter part of the P-III phase of adaptation. As noted previously, no means exist at present to date adequately P-III phase site locations relative to one another within the phase.

Thus the P-IV sites located during the surveys of Cochiti Reservoir offer tremendous potential for investigating aspects of the P-IV adaptive system, in particular, those involving the small structural and specialized production and procurement sites (one to five room sites, nonstructural sites, shelters and terraces). Past investigations concerning P-IV sites have focused upon the large, aggregated centers and have generally ignored the smaller P-IV components or dismissed them as agriculturally related "field houses." An examination of the patterning of P-IV sites in both the study area and project area suggests, however, that the smaller components are not uniform and, in fact, potentially reflect several different aspects of the P-IV production and procurement adaptation. An investigation into the character of variability manifest among these small P-IV site locations and their articulation with the major village centers will provide information about the nature of P-IV agriculturally-based adaptation which has been assumed but rarely examined.

HISTORIC PERIOD ADAPTIVE SYSTEMS

Preliminary archeological and historical research concerning the nature of adaptive change within the Middle Rio Grande and Cochiti Reservoir area for the Historic Period suggests a great diversity in strategies of subsistence and land utilization which have been implemented by human populations over the last 375 years. Processes of adaptive change throughout this period can be understood, in part, through reference to the political, social and economic structure of the articulation between local populations and their greater supra-regional industrial and nonindustrial nation state systems. Observable changes in population size, settlement and subsistence strategy at the local level can be evaluated for information they provide about the operation of nation-state adaptive systems.

At present seven political and economic phases of adaptive behavior have been defined for the Historic Period. These phases have been discussed in detail in Abbink and Stein, this volume, and include: Spanish Exploration (ca. A. D. 1540-1598); Spanish Colonization (A.D. 1598-1680); Pueblo Revolt and Reconquest (A.D. 1680-1692); Spanish Colonial (A.D. 1692-1821); Mexican (A.D. 1821-1846); Territorial (A.D. 846-1912), and Statehood (A.D. 1912 to present).

Archeological documentation of adaptive change during the Historic Period is difficult since the processes of change throughout the period are rapid, resulting in the deposition of relatively few site locations attributable to the operation of any given adaptive phase. The archeological record of these changes is further compounded in the sense that the adaptive contexts conditioning the structure and organization of food procurement, production and consumption activities within the study area might be expected, in large part, to be dictated by the political, social and economic organization of the nation-states which were operating over extremely large effective regions when compared to the spatial extent of effective regions of prehistoric adaptive behavior. Thus policies affecting land utilization, trade and political structure within the study area were often instituted from political centers in Spain, Mexico and the eastern seaboard of the United States.

Because of the complexity and accelerated rates of adaptive change expected, the research perspective against which the significance of Historic Period sites will be assessed, is necessarily of a more general nature than that presented for the Archaic and Anasazi Periods. An emphasis will be placed upon evaluating the explanatory utility of employing essentially political criteria to define phases of adaptive behavior. Preliminary historical research suggests that the study area constituted a region largely peripheral to major centers of nation-state administration, and the degree to which administrative policies operated as determinants of subsistence related behavior within the study area must be critically examined.

1. Spanish Exploration Phase (A. D. 1540-1598)

The Spanish Exploration Phase was characterized by a series of four expeditions into the New Mexico area which were undertaken as quasi-entrepreneurial exploratory surveys. The object of these surveys was to gather information concerning the settlement potential, mineral and indigenous labor "wealth" of the northern frontier of the Mexican Viceroyship. Three of the expeditions made contact with the inhabitants of Cochiti Pueblo: Coronado in ca. 1540; Chamuscado-Rodriguez in 1581, and Espejo in 1582 (Lange 1959:8-9). Aside from short-term disruption imposed by requisition of food, clothing and habitation space by these expeditions, there is little historic evidence that the indigenous Anasazi adaptive system within the Middle Rio Grande region underwent substantial change in response.

2. Spanish Colonization Phase (A. D. 1598-1680)

The Onate expedition of 1598 marked the first successful attempt to settle the New Mexico area. After an initial stay near the vicinity of San Juan Pueblo, to the north of the Cochiti study area, a base of operations was established at Santa Fe in 1610, and Spanish administration and economic articulation with the indigenous populations continued for the next 70 years.

The impact of this Spanish immigration on the structure and organization of the Anasazi adaptive system was profound. Food resources within the effective region were dramatically changed with the introduction of domesticated livestock species including sheep, goats and cattle. The introduction of domesticated horses resulted in an equally dramatic change in the strategy of transportation of both food and technological resources throughout the area of effective Spanish control. Indigeneous Anasazi populations were as well subjected to the effects of a Spanish economic strategy which was predicated upon establishment of administrative control over subsistence related activities.

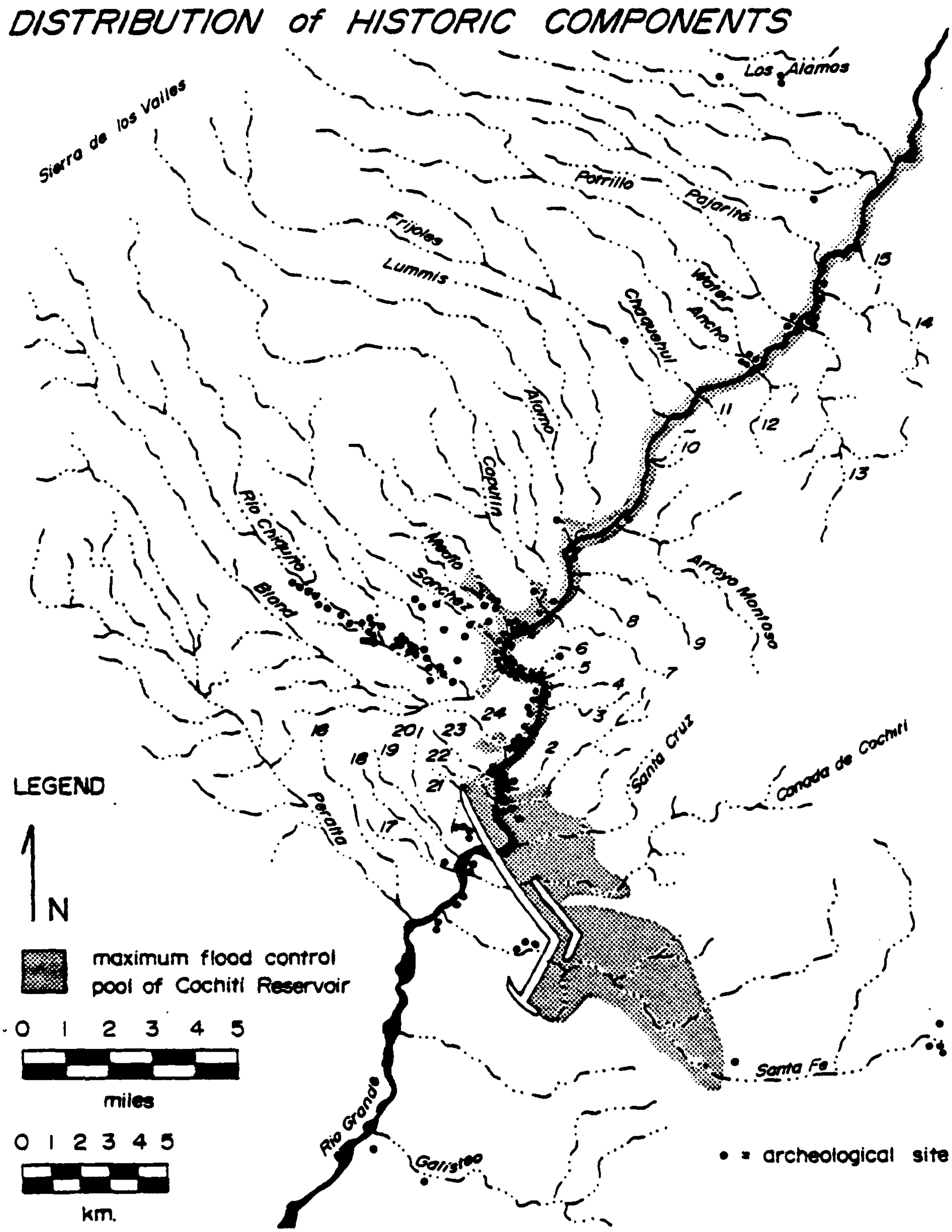


FIG. III.5.10 Distribution of Historic Period Components in Cochiti Reservoir and the Cochiti Study Area

The Spanish adaptive system was largely dependent upon the labor of indigenous Anasazi populations for procurement and production of food resources and essentially assumed control of the logistical strategies through which those food resources were stored and redistributed throughout the populations. This administrative system suffered from internal difficulties arising from church and state conflicts over the jurisdictional rights to indigeneous labor, and ultimately overtaxed the productive capability of the indigenous work force.

Spanish administrative policies substantially disrupted pre-existing trade relations between Anasazi and Apachean populations which resulted in considerable stress upon the latter groups because of their need for Anasazi produced agricultural foodstuffs. Apachean groups responded to this stress throgh raiding Spanish and Christianized Anasazi settlements for both livestock and agricultural produce, which in turn accelerated dissolution of the already deteriorating system of production and redistribution of foodstuffs imposed by the Spanish administration.

3. Pueblo Revolt and Reconquest Phase (A.D. 1680-1692).

The combined effects of Spanish administrative disruption of the Anasazi-Apachean system of food resource procurement, production and redistribution, and deteriorating administrative organization of ecclesiastical and secular branches of the Spanish government led to severe stress upon the productive capabilities of the indigenous work force throughout the effective region of Spanish control by the 1670's. A severe, region-wide drought and at least two epidemics during the 1670's accelerated processes which led to the Pueblo Revolt of 1680 in which the Anasazi population of New Mexico and many Apachean allies undertook an organized rebellion and drove the Spanish from the entire area. Spanish control was re-established in 1692 by De Vargas' reconquest.

Descriptions of Anasazi settlements recorded during De Vargas' reconquest in 1692 suggest that the phase was characterized by a great degree of population movement throughout the region. The degree to which such movement reflects attempts to re-establish a regional system of food production and redistribution, or reflects a period of disorganization and local group attempts to redefine effective territories for food resource production and procurement is unclear at present.

4. Spanish Colonial Phase (A.D. 1692-1821)

This phase was initiated by De Vargas' expedition to re-establish Spanish control over the New Mexican frontier. The economic strategy of Spanish adaptation during this phase changed from that employed during the Colonization phase. While a somewhat similar ecclesiastical and secular administrative structure was employed to administer the indigenous labor force, homestead settlement of many areas by Spanish and "naturalized" Hispano-Indian households was encouraged on a large scale. The Colonial phase was thus characterized by continual immigration of individuals, families and households for purposes of settlement rather than administration. A system of land grants was established to convey both exclusive and common rights of agricultural and pastoral land usage to individuals, groups of families and native tribal entities. Extensive trade in woolen yardgoods was established between New Mexico and Mexican markets, which gave rise to partido sheepherding as a major economic strategy dictating land usage within many parts of New Mexico.

Trade exchange of food resources between Anasazi and Apachean groups was essentially cut off by Spanish intervention, but during the Colonial phase large scale livestock herding helped provide a food resource buffer to complement the predominantly agricultural production of Anasazi populations. This strategy, while in part solving problems concerning the regional system of procurement, production and redistribution of agricultural and faunal food resources for Anasazi and Spanish populations, accelerated raiding activities by Apachean groups, and necessitated considerable investment of time and labor into defensive and offensive military operations.

A system of presidios, or small forts, were constructed near settlements at the fringes of the effective region of Spanish control shortly after the reconquest. Small companies of Spanish soldiers were garrisoned at these presidios for defensive purposes. A second military strategy employed involved a series of major offensive campaigns undertaken with large companies of Spanish and Anasazi soldiers into frontier areas inhabited by Apachean groups with the objective of killing or capturing individuals for use or sale as slaves. As the New Mexico area became increasingly saturated with Spanish homestead settlers, the presidio system was discontinued, while offensive military campaigns were continued throughout the Colonial phase until the latter two decades of the 18th century.

With the exception of in-migrating settlers, little in the way of direct logistical support for the secular activities of the colony was provided by the Viceroyship in Mexico during this phase. The ecclesiastical branch of the government was provided on a more regular basis with items such as parchment, frocks, cruets, etc. necessary for religious administration of local parishes, and with minimal numbers of implements such as hoes and plowshares to be used in production of foodstuffs to support the ecclesiastical staff of each mission. Spanish settlers were thus largely dependent upon their own or Anasazi labor for manufacture of implements and construction of facilities throughout the Colonial phase.

Archeological documentation of these four phases from surficial evidence is difficult because of the imprecise nature of ceramic dating. Both Group E and Group F Glaze Wares were manufactured during early phases of Spanish occupation, but no single ceramic type within these two groups can be employed to distinguish components dating specifically to either the Spanish Exploration or the Spanish Colonization phase. Such ceramic dating is further hampered because the early variant of Puaray Glaze Polychrome (Group E) began to be manufactured ca. 25 years prior to Coronado's expedition; while Kotyiti Glaze types (Group F) were manufactured throughout the Pueblo Revolt and Reconquest phase as well as during the latter part of the Spanish Colonization phase (ca. 1700). In addition, several historic carbon paint ceramic types (including Tewa Polychrome, Posuge Red and Kapo Black) began to be manufactured either just prior to or just after the Pueblo Revolt of 1680, and continued to be made throughout the Spanish Colonial phase.

Given this lack of covariance between styles of ceramic manufacture and historically defined phases of adapta-

tion, previous researchers have generally categorized site locations or components exhibiting Group E and F Glaze Wares as dating to the "P-V" or Historic Anasazi phase.

A total of 37 site locations exhibiting P-V (Historic Anasazi) components have been previously documented within the study area. Only 17 of these locations are single component sites, while the remainder are multi-component (P-IV/P-V and P-III/P-V) locations. Site locations exhibiting P-V components range in size from one to 800 rooms, with the majority of sites falling between one and seven rooms. Both single and multi-component P-V sites exhibited a distinct bimodal size distribution of small sites (one to seven rooms) and large sites (112-800 rooms). This size distribution is similar to that characterizing the P-IV phase and may reflect a similar strategy of land utilization within the study area by Anasazi populations, despite the effect of Spanish administrative control over other areas within the Middle Rio Grande region.

For purposes of the Cochiti Reservoir project, ceramic types known to have been manufactured within the Historic Period were employed to assign provenience locales of site locations into one or more of the historic phases outlined by Abbink and Stein (this volume). The "Historic Anasazi" or P-V phase designation was not employed because of the vaguely defined temporal frame it encompasses.

Survey of the Cochiti Reservoir permanent and flood control pools resulted in documentation of no site locations which could be positively assigned to the Exploration phase, and only one provenience locale characterized by a nonstructural scatter of lithic artifacts and ceramic fragments which could be assigned to the Colonization phase. Three site locations within the project area which had been previously excavated by the Museum of New Mexico (LA 70, LA 591 and LA 6178) exhibited components dating to the Colonization phase, however.

Historical documentation of the structure and organization of Anasazi adaptive systems during the Exploration phase is limited to sketchy accounts compiled during exploratory expeditions into the New Mexico area. Historical records treating the Spanish administration of Anasazi populations and contexts of Spanish settlement within the study area during the Colonization phase are equally sketchy. Initially the nearest major parish serving as a center of administrative control in the vicinity of the study area was at Santo Domingo Pueblo, and included Cochiti Pueblo as a visita. A resident friar is noted at Cochiti Pueblo itself in 1637, and a mission was apparently established at Cochiti by 1667 (Lange 1959: 9).

It thus seems apparent that the population of Cochiti Pueblo was being administered by the Spanish government during the Spanish Colonization phase, but data concerning the effect that administration had upon the subsistence related activities of the Cochiti population are absent. It is not known from historical documentation if the Spanish administration involved use of Cochiti labor for pastoral herding within the study area, or focused upon exacting tribute in the form of agricultural foodstuffs produced by the population, or both. The presence of several large and many small P-V sites within the study area is not mentioned in the historical literature. This fact suggests that the P-V sites within the study area were either not inhabited during the Colonization phase, or were inhabited by Anasazi populations who were not articulating with the Spanish administration throughout the phase.

In either case, site locations classified either as P-V or as Colonization phase are potentially informative about processes underlying the dynamics of Anasazi adaptive behavior in response to Spanish in-migration and administrative control of indigenous populations.

Little is known either historically or archeologically of the nature of Anasazi and Apachean adaptation throughout the Revolt and Reconquest phase, and no means exist to assess site locations or components to this phase through surficial documentation. Only one site location within the study area (LA 295, or Old Kotyiti) has been positively dated through dendrochronology to have been constructed, inhabited and abandoned during this phase. No site locations exhibiting definite Revolt and Reconquest phase components were encountered during survey of the project area.

Previous research has resulted in documentation of six site locations exhibiting components dating to the Colonial phase, all of which are located within the project boundaries. Of those six, LA 6178 has been excavated by the Museum of New Mexico (Snow 1973b), LA 9139 tested by the same institution, and four were redocumented during the Cochiti Reservoir survey. Including these four site locations, a total of 23 provenience locales within 18 site locations were documented during survey which exhibited 17th or 18th century ceramics dating to the Colonial phase of the Historic Period.

Historical documentation suggests that two strategies of land utilization for resource production characterized the Colonial adaptation to the study area. Land grants were given for rights to grazing lands on the east side of the Rio Grande river within the study area, and for rights to homestead settlement on the west side of the river. The site locations recorded during survey reflect both pastoral and homestead activities as a variety of house and corral structures situated on both banks of the Rio Grande within the southern portion of White Rock Canyon.

All of these sites are of potentially great significance in that they can provide much more specific information concerning the nature of local adaptive behavior of Spanish settlers during the Colonial phase. Archeological documentation of specific subsistence related activities engaged in by Spanish homestead households can provide a realm of information now lacking in the historical record. Critical considerations in this regard include the degree to which early Spanish settlers were dependent upon domesticated or nondomesticated food resource species for subsistence, or upon exchange with local Anasazi populations for food resources. Similarly, much can be learned about the nature of Spanish technology of tool manufacture, ceramic manufacture and house construction which is largely unknown at present. Economic and social relations governing the organization of labor, household composition and interaction between Spanish and Anasazi populations at the local, sub-regional level are poorly documented in the historical record, and site locations within the project area dating to the Colonial phase can provide such information.

5. Mexican Phase (A.D. 1821-1846)

Mexico's revolt and independence from the Spanish empire in 1821 marked the beginning of the Mexican

phase. This short phase is poorly documented in the historic record. The effect of Mexican independence upon administrative and economic behavior in New Mexico, while poorly documented, seems to have resulted in severing many economic and ecclesiastical ties between the colony and Mexico itself. Many settlers left the colony for Mexico at the beginning of the phase. New Mexico became in effect, a land-locked, largely self-sufficient colony until 1846. The Santa Fe Trail was established in 1820, marking the first economic interaction between the New Mexico region and the industrially based United States nation-state. While limited trade in wool was engaged in via the Santa Fe Trail, no substantial economic relations were established until the United States acquired the New Mexico Territory in 1846. No archeological sites have been recorded in either the study or project areas which can be assigned definitively to this phase.

Major problem areas in identifying Mexican phase manifestations reside in lack of knowledge concerning styles of ceramic manufacture undertaken during the phase, and an expectation that little in the way of trade items would have been circulating within the region.

6. Territorial Phase (A.D. 1846-1912)

The acquisition of New Mexico from Mexico by the United States in 1846 initiated a series of rapid changes in the structure and organization of adaptive behavior within the region. U. S. military operations resulted in construction of a system of forts around the fringes of the effective region of Spanish and Anasazi settlement, and by the 1870's Apachean populations were largely relocated within reservation boundaries. This permitted expansion of Spanish and in-migrating Anglo settlers into many areas of the region which were previously uninhabitable due to Apachean raiding activities.

An extensive wool trade was established via the Santa Fe Trail, which combined with market for agricultural food resources, hay and domestic livestock provided by U. S. military garrisons and government policies of reservation administration, resulted in an entrepreneurial organization of food production and services in many sectors of the region.

Trade for industrially manufactured products including canned goods gradually accelerated along the Santa Fe Trail during the initial years of the Territorial phase. The introduction of the railroads into the New Mexico territory in the 1880's resulted in massive importation of such goods from eastern industrial centers, and facilitated large scale timbering, mining and cattle raising operations within the territory as well. By the end of the 19th century, a money based economy was operating within the New Mexico territory which began to replace the pre-existing barter economy as a means of redistributing goods and services. Wage labor job opportunities were provided through mining and timbering operations, and a network of retail store outlets for industrially produced foodstuffs and technological items provided the basis for a gradual region wide change in subsistence related behavior.

Although several major sites of human occupation dating to the Territorial phase exist within the study area, very few have been documented as archeological phenomena through previous research. Three distinct land utilization strategies are reflected in Territorial phase sites, including homestead settlement, short term camps and towns owing their existence to timbering and mining operations, and seasonally inhabited herding camps.

The Rio Chiquito drainage served as a major location of homestead settlement within the study area. Referred to as La Canada, this community was established during the Colonial phase, and was inhabited by fluctuating numbers of households engaged in subsistence farming and herding until the early 20th century. The short-lived town of Bland was established in the early 1890's after a gold and silver strike in Bland Canyon, and supported a large population for ca. 10 years of mining operations.

A seasonally inhabited timbering and sawmill camp ("Boom") was established directly below the mouth of White Rock Canyon on the east side of the Rio Grande between 1907 and 1912. Logs felled by crews in the Pajarito Plateau were "boomed" down White Rock Canyon to the camp, manufactured into railroad ties and transported via spur line from the camp to other parts of New Mexico and the Southwest for track construction. Although the camp itself had been inundated by the reservoir prior to the initiation of survey, an extensive midden area situated on the terrace directly above "Boom" was documented as LA 12434.

Pastoral herding activities within the study area have been primarily documented through archeological survey of the Cochiti Reservoir permanent and flood control pools. This survey recorded 24 proveniences of 21 site locations which date to the late 19th or early 20th centuries.

The majority of these provenience locales were characterized by corrals and/or single room habitation structures. Another aspect of this specialized herding activity is represented by a pumphouse (LA 12453) constructed on the east side of the river across from Capulin Canyon, and another location (LA 12458) across from Bland Canyon which had been leveled into a steep talus slope through blasting and was littered with lengths of 3" diameter pipe similar to that leading from LA 12453 to the Cerros del Rio Plateau.

It is quite possible that many of the corral, pen and windbreak structures which comprise the majority of "undated" site locations within the project area may represent Territorial phase herding activities. One intriguing observation concerning pastoral utilization of the project area is that only two corrals and two habitation structures can be definitely assigned to a post World War I date through associated artifactual materials. Because the project is necessarily defined by elevational contours encompassing land surfaces adjacent to the Rio Grande River, it is clear that the technological capability to provide dependable water supplies for livestock upon the expansive grazing lands of the Cerros Del Rio Plateau did not evolve until after some two hundred years of political and economic attempts to adjudicate access to a single source of water represented by the Rio Grande in White Rock Canyon. Development of drilled wells and constructed tanks resulted in an obvious redefinition of the effective pastoral environment with respect to this critical resource in ca. A. D. 1920, as monitored from archeological evidence alone.

The study area thus exhibits archeological resources reflecting a full range of adaptive behavior characteristic of the Territorial phase including homesteading, herding,

mining, timbering and railroad construction. The project area, as defined by the Cochiti Reservoir permanent and flood control pools, reflects only part of this adaptive behavior archeologically, in that direct archeological evidence of mining activities are not found.

7. New Mexico Statehood Phase (A.D. 1912-present)

The Statehood phase is defined by the change in political status of articulation of the New Mexico area with the United States. Site locations within the study area exhibiting components dating to this phase have not been systematically documented through previous archeological research. This is possibly due in part to a previously held bias that "modern" historical remains do not constitute a proper realm of archeological research, and possibly due to the fact that processes underlying changes in regional adaptive behavior since 1912 have resulted in a set of very specialized and peripheral strategies of land and resource utilization within many parts of the study area.

Examples of diversity in specialization of this sort can be illustrated in several ways, most of which have not been documented from an explicitly archeological perspective for the study area. Timbering, as an economic enterprise, has continued as a sporadic seasonal pursuit throughout the Statehood phase, and has resulted in substantial road construction within the Pajarito Plateau district, and in construction of a sawmill facility at Domingo along the Galisteo drainage.

Professional anthropological research has constituted another realm of specialized behavior affecting land and resource utilization within the study area. This research dates from the last few years of the Territorial phase to the present, and is documented by Biella (this volume). One major effect of archeological research within the study area has been transformation of the land tenure of a sizeable portion of the Pajarito Plateau from privately owned to publicly administered National Monument status. Subsequent construction of a visitor center, roads, trails and prehistoric site stabilization projects within Bandelier National Monument has resulted in recreational utilization of large portions of the study area.

The townsites of Los Alamos and White Rock represent similar specialization in land utilization strategies dictated by an expanding industrially based nation-state. In this case, the need for an "isolated" locus to establish a goal directed research community resulted in construction of roads, habitation facilities and specialized research plants within the northern portion of the study area because of its marginal location with respect to existing population centers elsewhere in New Mexico and the United States. Once established, the two communities have since become economically viable population centers due to their specialized articulation with the greater nation-state. In this sense, both the Los Alamos and White Rock settlements support resident populations through their exchange of research services for food and technological resources, much like the economic relationship of the smaller resident population of personnel administering Bandelier National Monument.

Other population centers within the northern portion of the study area were largely abandoned shortly after the beginning of the Statehood phase. The mining town of Bland, which at its height of population during the 1890's boasted 21 saloons, two newspapers and a public school, folded economically at the turn of the century. The community of Canada situated along the Rio Chiquito drainage was depopulated more gradually, and the Canada Grant was ultimately purchased by James Young in the 1920's, who later established a commercial apple orchard at the upper end of the Rio Chiquito. This orchard is still maintained and managed by Mr. and Mrs. Fred Dixon, and the Dixon homestead in many ways represents the last remaining site location within the Pajarito Plateau district at which an agricultural and pastoral adaptation to the environment is still being pursued.

Another realm of specialized land and resource utilization of the northern portion of the study area is reflected in recreational behavior. Archeological survey of the Cochiti Reservoir permanent and flood control pools resulted in documentation of 28 proveniences within 20 site locations exhibiting Statehood phase components. Of these, 15 were campsites characterized by fire hearths situated within 10 meters of the river's edge within White Rock Canyon. An additional ten similar campsites were recorded as isolated occurrences, and a variety of isolated beverage cans and bottles were documented as well within the canyon.

The construction of Cochiti Dam and associated camping and boating facilities can be expected to accelerate recreational behavior within the northern portion of the study area in future years, and represents another stage in the changing articulation of human adaptive behavior and the environment within that portion of the study area.

In contrast to the increasingly specialized contexts of adaptation which characterize human behavior throughout the Statehood phase within the central portion of the study area, the Rio Grande Valley below White Rock Canyon exhibits three communities which have gradually increased in population since 1912. Two of these, Cochiti and Santo Domingo, are Pueblo Indian settlements which have been inhabited by Anasazi populations more or less continuously from the 11th and 14th centuries A. D.. respectively. The third community, Pena Blanca, is a largely Hispanic community dating from the late 18th to early 19th century. The populations inhabiting these settlements engage, at present, in a variety of subsistence-related economic strategies including farming, herding and wage labor. The latter strategy is facilitated by an extensive paved road network permitting commuter traffic to either Santa Fe or Albuquerque.

STRUCTURAL UNKNOWN SITE LOCATIONS

Forty-three proveniences from 30 structural site locations were recorded during the intensive surveys which lacked diagnostic artifacts and hence could not be definitively assigned to any specific temporal or cultural period. An additional 157 proveniences from 70 site locations were tentatively assigned to either Anasazi (?) or Historic (?) based upon architectural similarity to dated Anasazi or Historic sites, respectively. Together these site locations constitute a class of phenomena in the project area whose potential significance is severely restricted in absence of temporal control. Future testing or limited excavations have the potential of producing datable artifactual debris. It is anticipated that these site locations will reflect limited use areas which are not obscured by multiple occupation sequences which result in larger surficial artifactual samples and hence datable

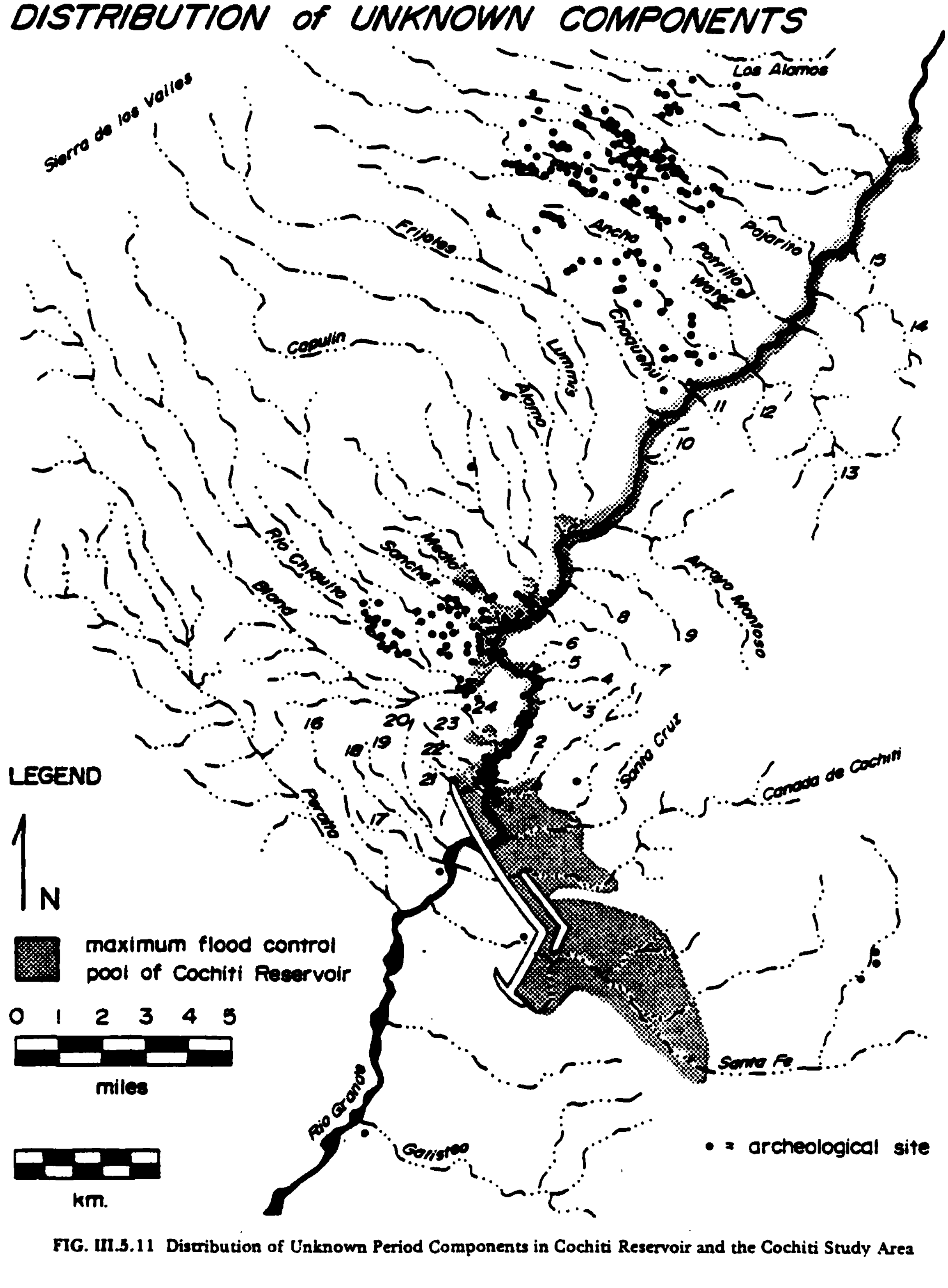


FIG. III.5.11 Distribution of Unknown Period Components in Cochiti Reservoir and the Cochiti Study Area

site locations. Thus these structural unknown sites have the potential to provide a sensitive monitor for change in adaptation within the reservoir.

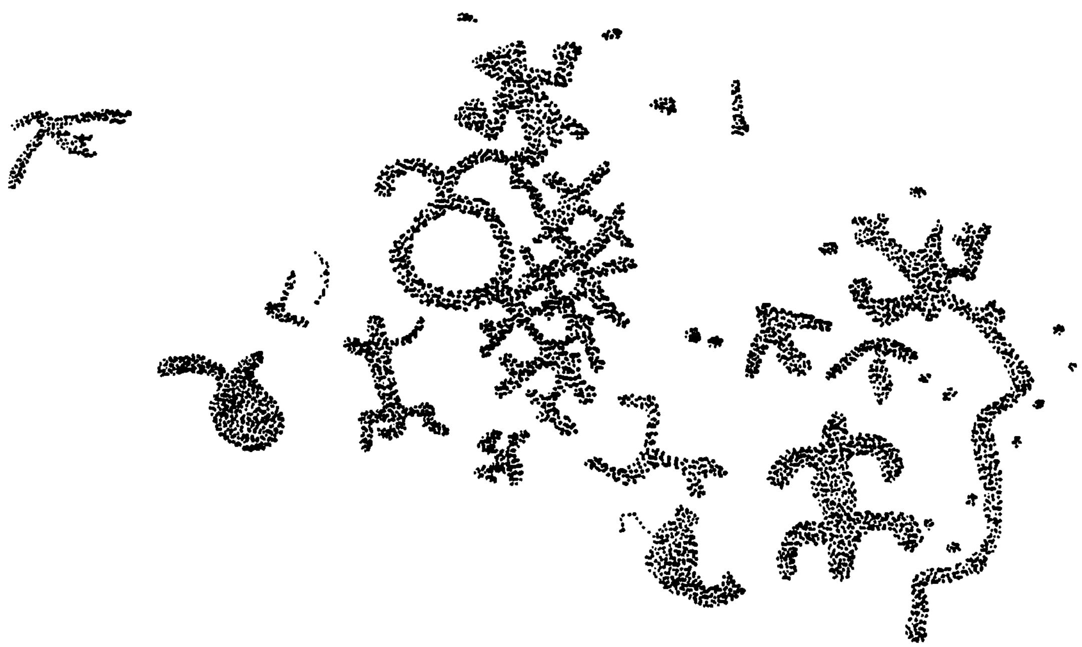
SUMMARY OF SIGNIFICANCE OF CULTURAL RESOURCES IN COCHITI RESERVOIR

Three hundred twenty-five sites were located on the surveys of Cochiti Reservoir. Of these 102 were located in the permanent pool resulting in a site density of 52.6 sites per square mile; and 223 were located in the flood control pool, resulting in a density of 17.3 per square mile. An additional 46 isolated occurrences were documented as well. The cultural resources recorded during the Cochiti Reservoir surveys thus reflect a relatively intensive human utilization of the area, especially White Rock Canyon. Only three vegetative communities within one ecological life zone, Upper Sonoran, were defined for the project area; and although a number of small habitats or ecological niches have been suggested for White Rock Canyon in particular (U.S. Army Engineers 1974:II-25), no clear patterns in the distribution of sites or classes of sites in the reservoir could be discerned ecologically.

The majority of sites located in the project area, regardless of temporal period, are small procurement and production locales. Although the specific structure of the sites (open camp sites vs. field houses vs. corrals) and the character of the articulation of these sites with their respective adaptive systems differ, a patterning of short-term occupation and apparent seasonality emerges. Only a few sites, notably LA 5014, 9138, 12161, 12511 and 12579 suggest a longer, perhaps year-round occupation. This overall similarity in the human utilization of the project area is distinct from the character of adaptation suggested by previous research in the other districts in the study area. As such, the cultural resources in the reservoir offer unusual research potential for examining the role(s) of short-term, seasonal site locations in understanding aspects of human adaptive systems in the Middle Rio Grande which have generally been overlooked in previous archeological research in the area. Further, the fact that many of the sites appear to represent single component occupations should facilitate the isolation of different activities conducted at the sites and thus permit a more thorough examination of the processes underlying change in human adaptive behavior in the project area.

Although none of the cultural resources documented during the surveys were formally nominated to the National Register of Historic Places, they nevertheless have the potential to provide scientifically significant information about human adaptation in the Middle Rio Grande. In particular, these cultural resources will permit isolation of variability among the kinds of seasonal, short-term subsistence related activities engaged in at site locations within a restricted ecological context. They will further provide much information about the nature of logistical strategies through which those activities were articulated into different regional systems of adaptive behavior at different times in the past.

These kinds of information are especially critical in understanding processes underlying change through time in adaptive systems, and constitute an entire realm of cultural variability within the Middle Rio Grande region which is unknown at present. While previous research has focused primarily upon large, permanent settlements, little attention has been directed toward understanding the dynamics of regional strategies of settlement, land and resource utilization through time. Analysis of site locations such as those characteristic of the Cochiti Reservoir would thus provide a significant contribution to Middle Rio Grande archeology through focusing upon the nature of short-term, seasonal subsistence related activities and their systemic context.



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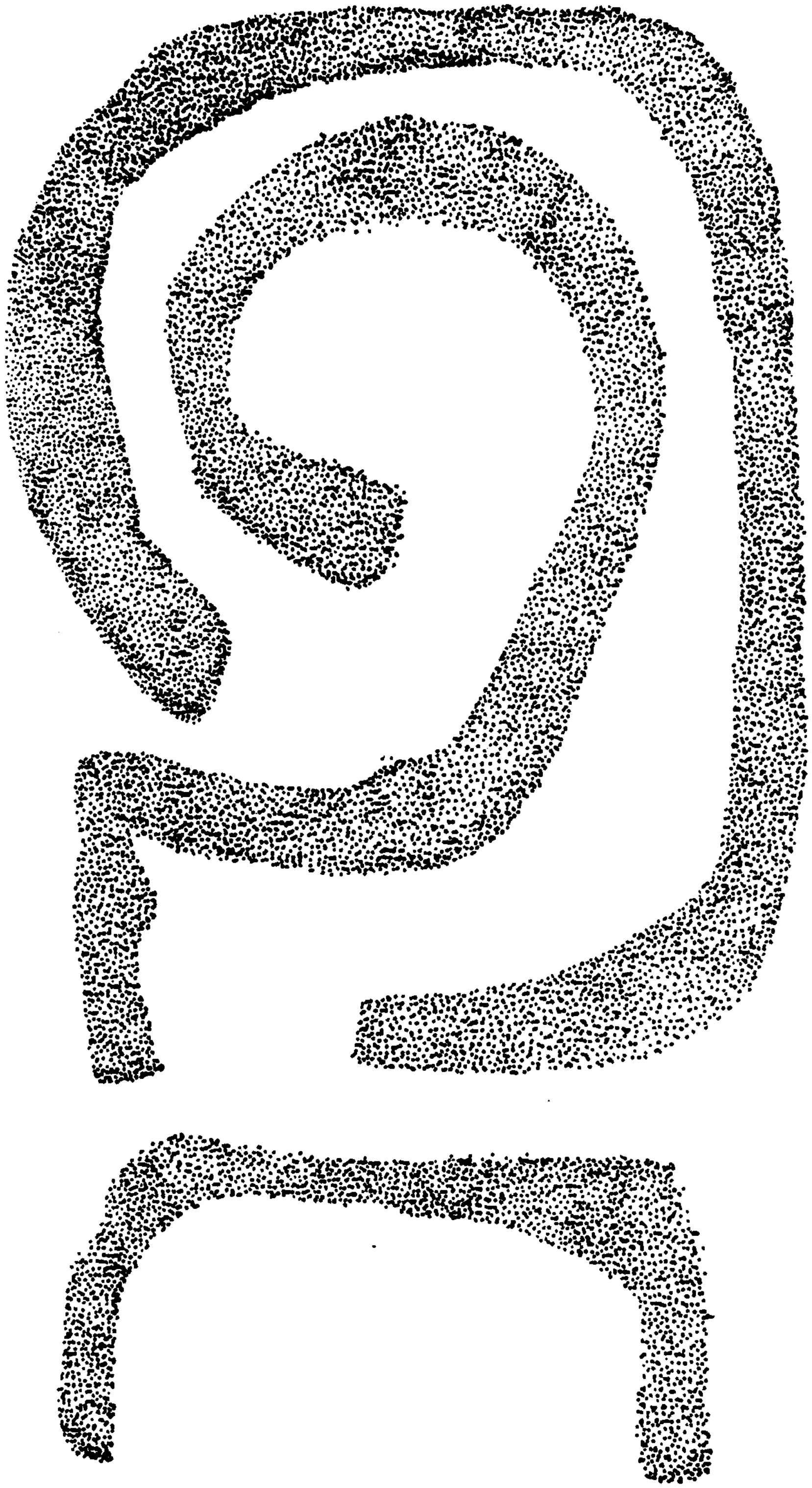

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FIG. II.2.1.

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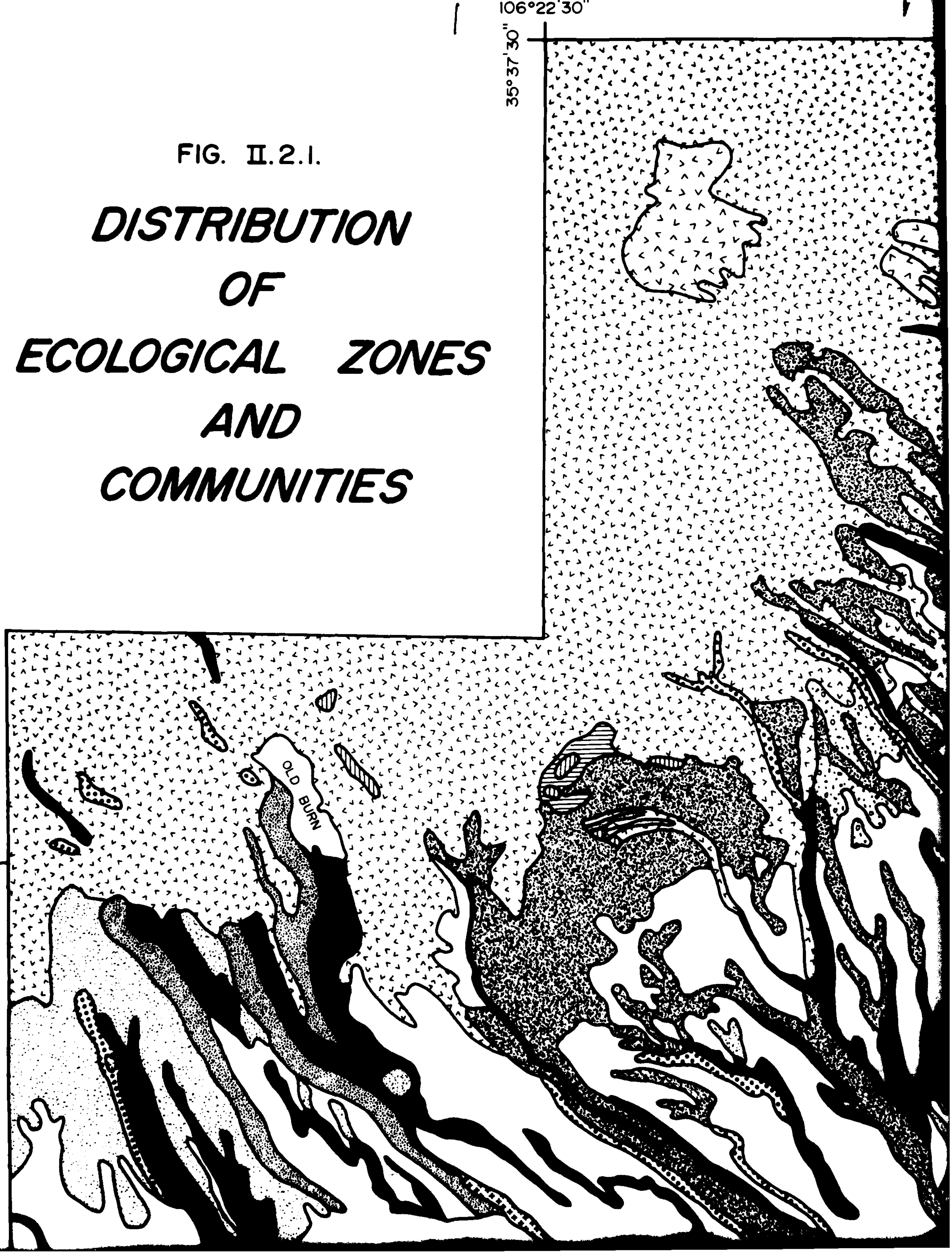

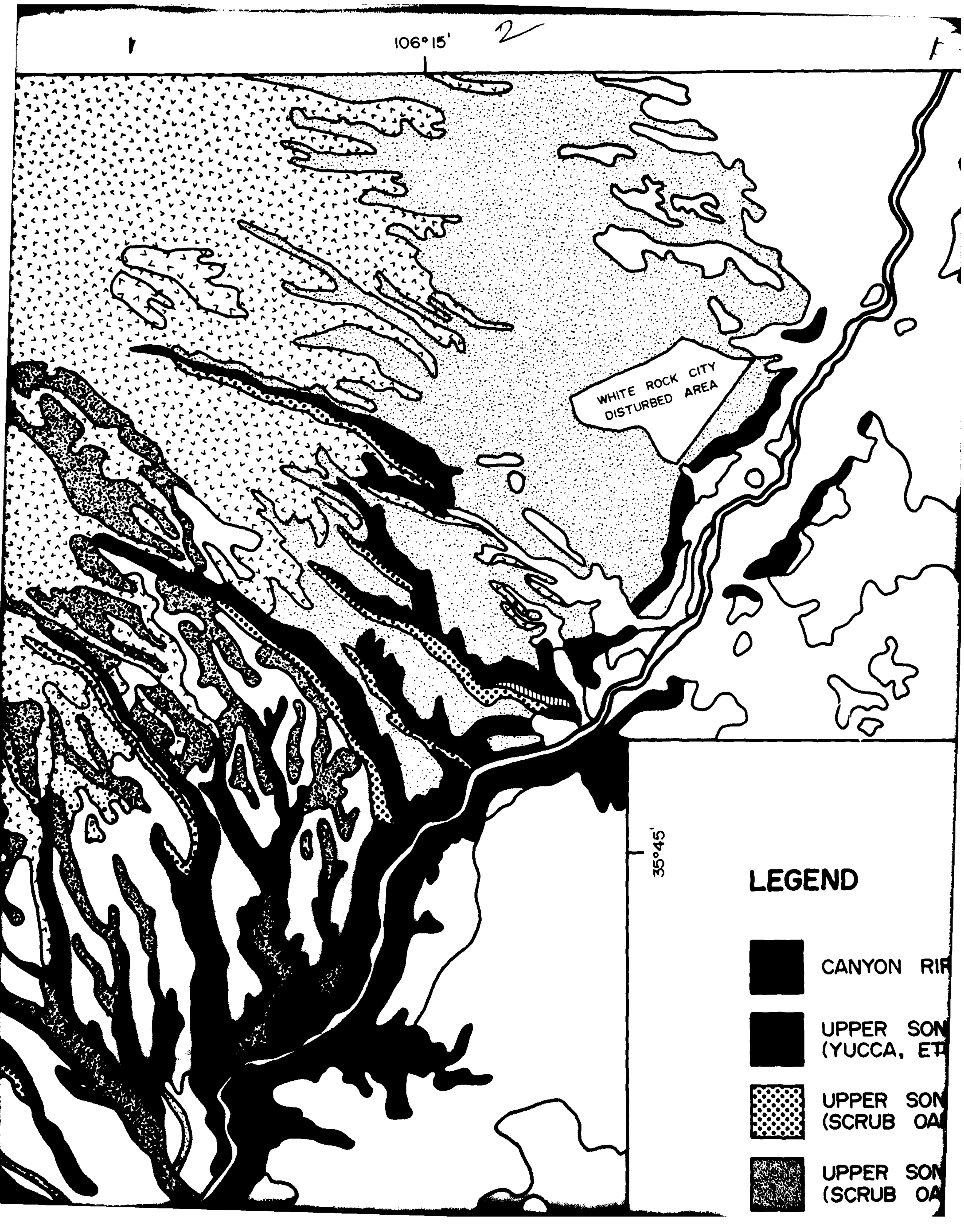

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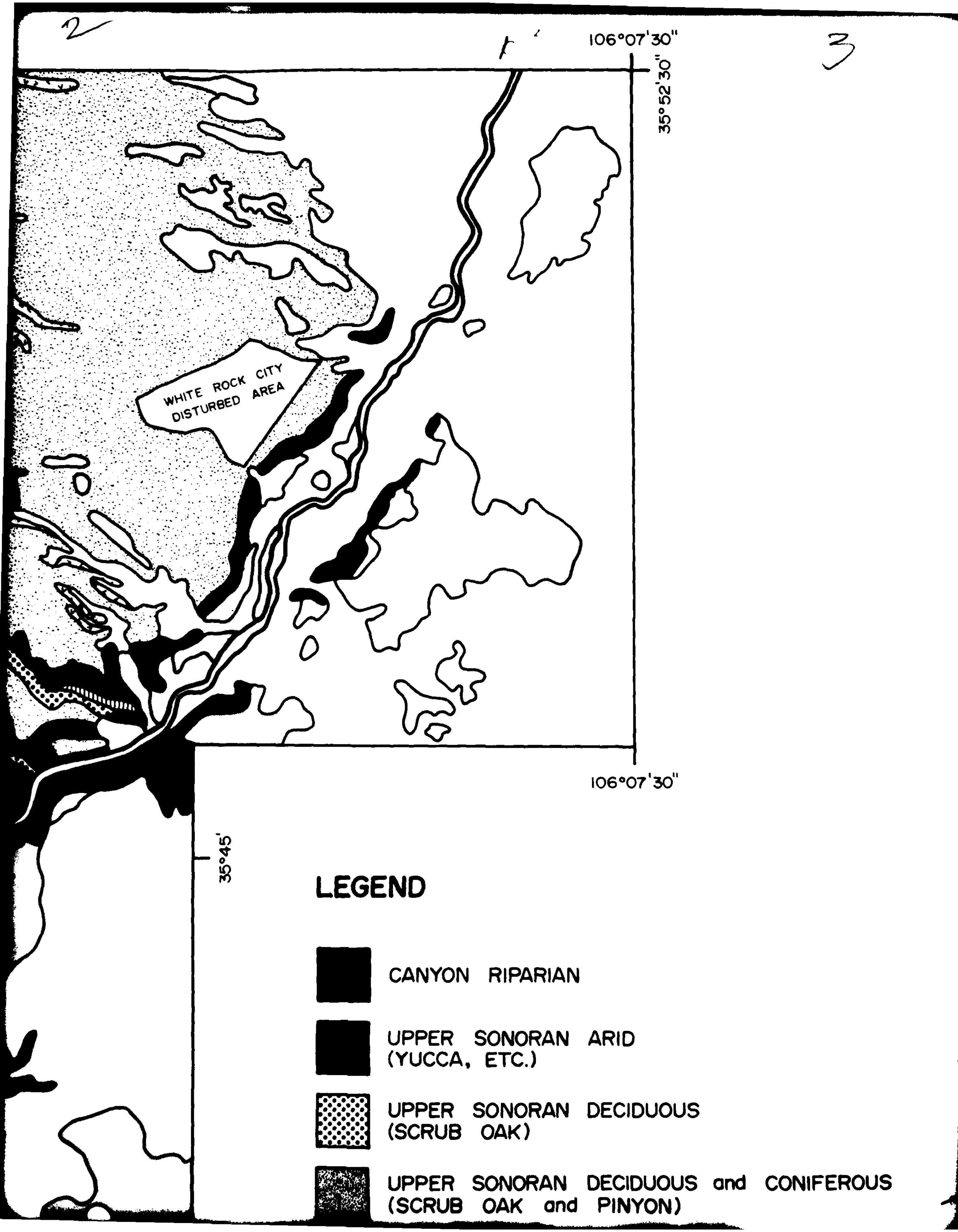
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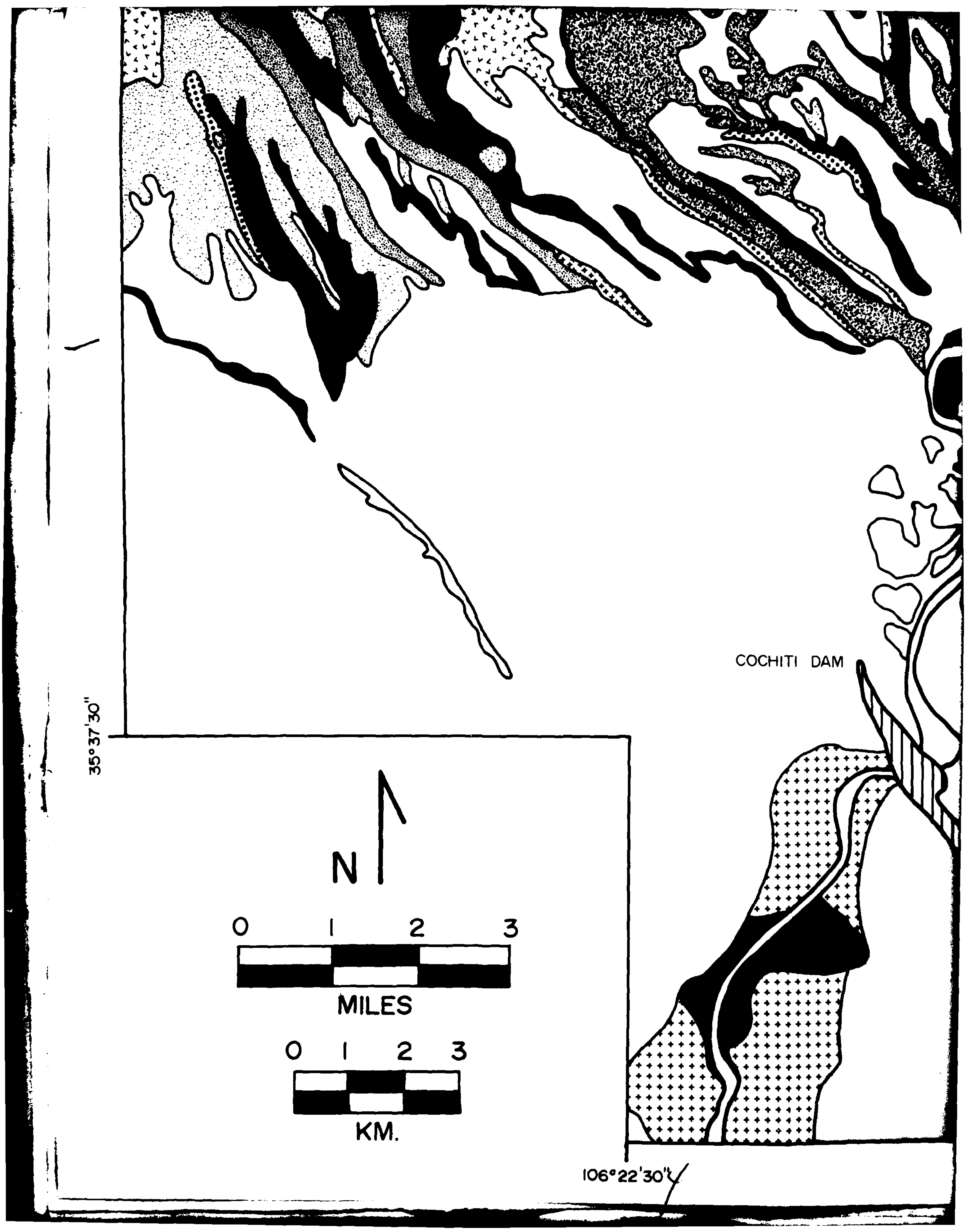
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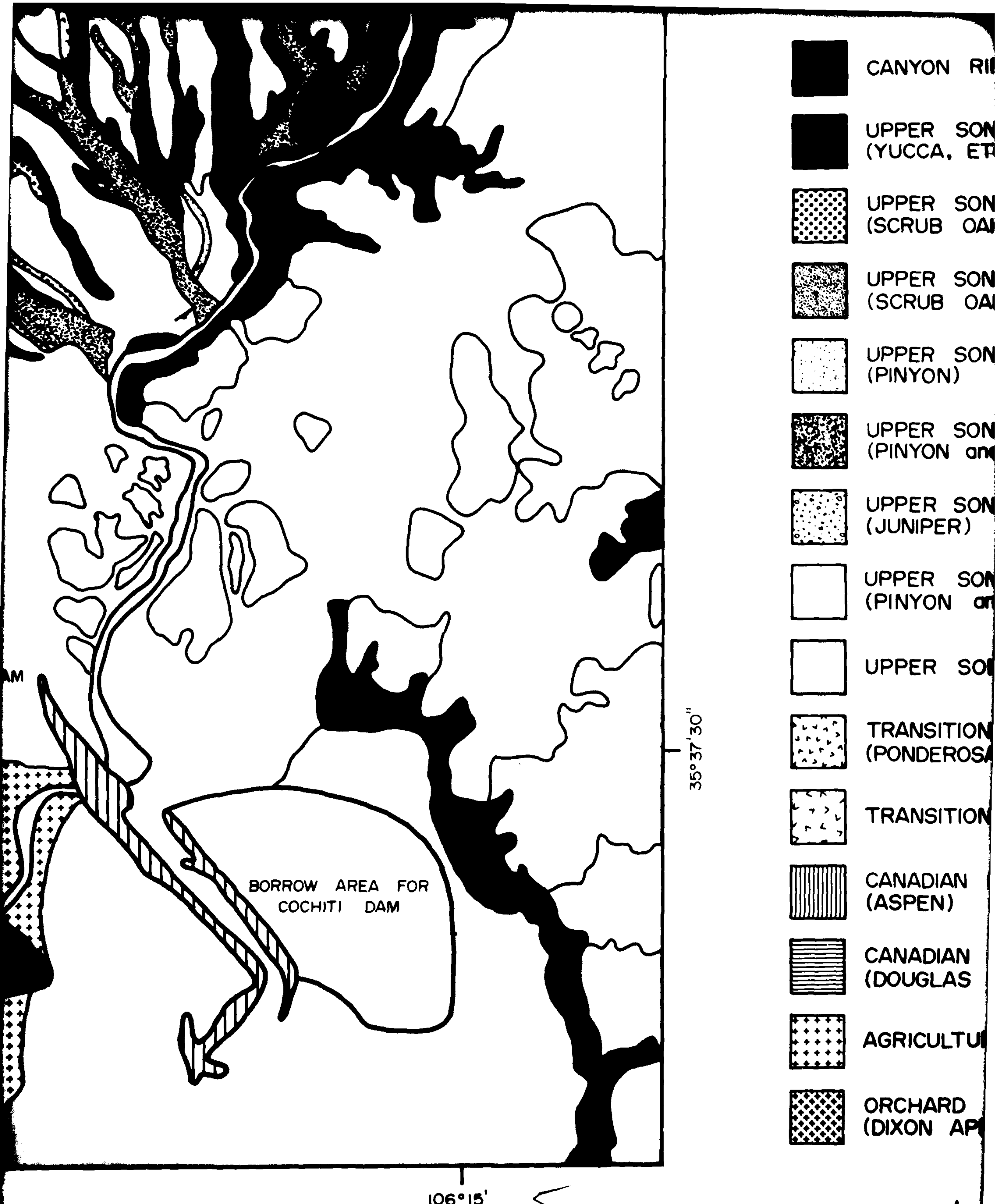

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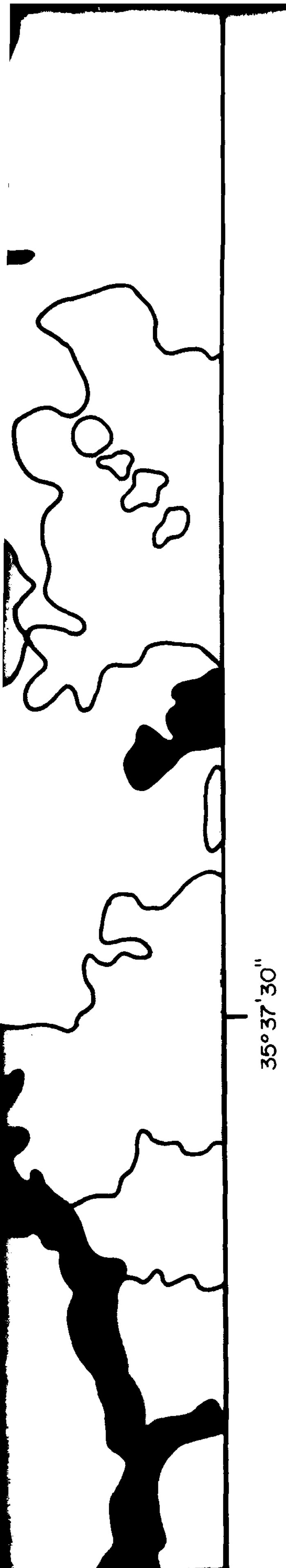

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- TRANSITION MOUNTAIN MEADOW
- CANADIAN DECIDUOUS (ASPEN)
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